1. Resumen

Este documento es el Anexo A perteneciente al trabajo de final de grado, *Diseño de un sistema de cobro automático para supermercados*. En este anexo A, se encontrará la información sobre las especificaciones y datos técnicos de los componentes que forman el sistema de cobro automático diseñado. Se incluirán tanto los componentes integrados en el carro de la compra como los del puesto de cobro.

2. Sumario

1. Resumen

2. Sumario

3. Componentes integrados en el carro de la compra

    3.1. Células de carga *Senel SX-1*

    3.2. Convertidor *ADS1231*

    3.3. Beaglebone Black

    3.4. BB View Cape – LCD 7”

    3.5. Módulo Bluetooth

    3.6. Batería

    3.7. BMS

    3.8. REF-02 5V Precision Voltage

4. Componentes del puesto de cobro

    4.1. Lector de tarjetas de crédito *Hitachi-Omron V2BF*

    4.2. Fuente de alimentación 12V *CP SNT 55W*

    4.3. Impresora de tickets térmica *Epson TM-T20*

    4.4. Pantalla táctil *MaxPos DTK-1598*

    4.5. Puertas automáticas *PNG 390 y PNG 390 Twin*

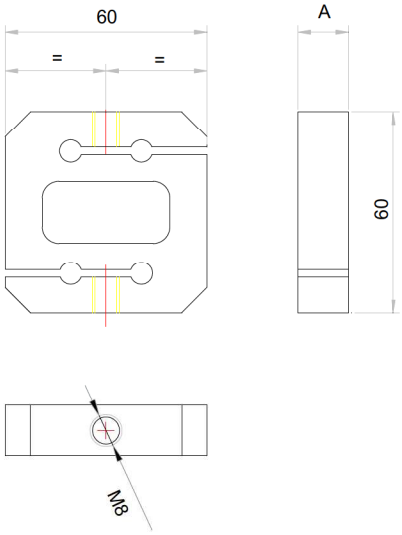
3.1. Células de carga *Senel SX-1*

SX-1

Capacidad (Emax): 30 - 50 - 75 - 100 - 150 kg

· Fabricación en acero niquelado
· Grado de protección IP67
· Aplicación: depósitos suspendidos, ganchos, hibridaciones, ...

Dimensiones



Capacidad (kg)	A (mm)
30	15
50	15
75	15
100	15
150	20

Características técnicas

Clase de precisión	C3
Escalón mínimo de verificación (Vmin)	Emax / 10.000
Sensibilidad (Salida Nominal)	2 mV/V ± 0.1%
Alimentación recomendada	5 a 15 V
Resistencia de entrada	350 Ω ± 5 Ω
Resistencia de salida	350 Ω ± 4 Ω
Resistencia de aislamiento a 50V dc	> 5000 MΩ
Error Combinado	< ± 0.02 % Salida Nominal
Margen de temperatura compensado	- 10 a 40 ºC
Grado de proteccion	IP-67
Sobrecarga sin deformación permanente	150 % Emax
Carga de rotura	> 500 % Emax
Longitud del Cable	5 m

Código de Colores	
Entrada +	Rojo
Entrada -	Negro
Salida +	Verde
Salida -	Blanco

SENEL TECHNOLOGIES S.A.
Pg. de la Riera, 28
Pol. Industrial Cova Solera
08191 RUBI (Barcelona)
Telf: +34 936 977 943
Fax: +34 936 977 944
E-mail: senel@senel.es
Internet: www.senel.es

3.2. Convertidor *ADS1231*

24-Bit Analog-to-Digital Converter for Bridge Sensors

Check for Samples: ADS1231

FEATURES

- **Complete Front-End for Bridge Sensors**
- **Internal Amplifier, Gain of 128**
- **Internal Oscillator**
- **Low-Side Power Switch for Bridge Sensor**
- **Low Noise: 35nVrms**
- **Selectable Data Rates: 10SPS or 80SPS**
- **Simultaneous 50Hz and 60Hz Rejection at 10SPS**
- **Input EMI Filter**
- **External Voltage Reference up to 5V for Ratiometric Measurements**
- **Simple, Pin-Driven Control**
- **Two-Wire Serial Digital Interface**
- **Supply Range: 3V to 5.3V**
- **Package: SOIC-16**
- **Temperature Range: –40°C to +85°C**

APPLICATIONS

- **Weigh Scales**
- **Strain Gauges**
- **Load Cells**
- **Industrial Process Control**

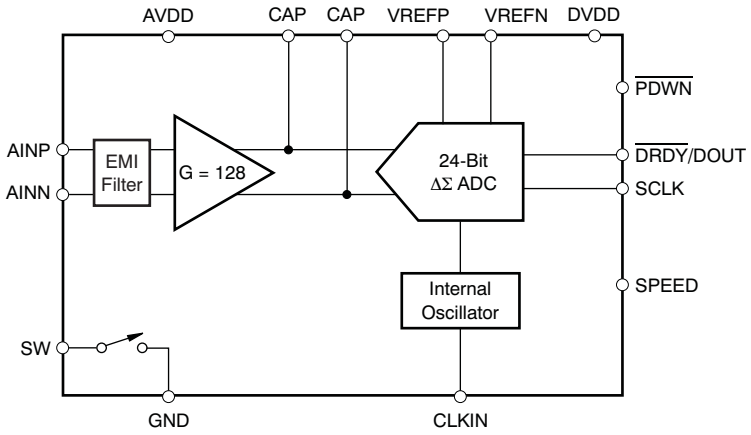
DESCRIPTION

The ADS1231 is a precision, 24-bit analog-to-digital converter (ADC). With an onboard low-noise amplifier, onboard oscillator, precision third-order 24-bit delta-sigma (ΔΣ) modulator, and bridge power switch, the ADS1231 provides a complete front-end solution for bridge sensor applications including weigh scales, strain gauges, and load cells.

The low-noise amplifier has a gain of 128, supporting a full-scale differential input of ±19.5mV. The ΔΣ ADC has 24-bit resolution and is comprised of a third-order modulator and fourth-order digital filter. Two data rates are supported: 10SPS (with both 50Hz and 60Hz rejection) and 80SPS. The ADS1231 can be put in a low-power standby mode or shut off completely in power-down mode.

The ADS1231 is controlled by dedicated pins; there are no digital registers to program. Data are output over an easily-isolated serial interface that connects directly to the MSP430 and other microcontrollers.

The ADS1231 is available in an SO-16 package and is specified from –40°C to +85°C.



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This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ORDERING INFORMATION

For the most current package and ordering information, see the Package Option Addendum at the end of this document, or visit the device product folder at www.ti.com.

ABSOLUTE MAXIMUM RATINGS(1)

Over operating free-air temperature range, unless otherwise noted.

		ADS1231	UNIT
AVDD to GND		–0.3 to +6	V
DVDD to GND		–0.3 to +6	V
Input current		100, momentary	mA
		10, continuous	mA
Analog input voltage to GND		–0.3 to AVDD + 0.3	V
Digital input voltage to GND		–0.3 to DVDD + 0.3	V
ESD(2)	Human body model (HBM) JEDEC standard 22, test method A114-C.01, all pins	±2000	V
	Charged device model (CDM) JEDEC standard 22, test method C101, all pins	±500	V
Maximum junction temperature		+150	°C
Operating temperature range		–40 to +85	°C
Storage temperature range		–60 to +150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) CAUTION: ESD sensitive device. Precaution should be used when handling the device in order to prevent permanent damage.

THERMAL INFORMATION

THERMAL METRIC(1)		ADS1231 SOIC (D) 16 PINS	UNITS
θ_{JA}	Junction-to-ambient thermal resistance	79.5	°C/W
θ_{JCtop}	Junction-to-case (top) thermal resistance	37.5	
θ_{JB}	Junction-to-board thermal resistance	37.1	
ψ_{JT}	Junction-to-top characterization parameter	5.6	
ψ_{JB}	Junction-to-board characterization parameter	36.7	
θ_{JCbot}	Junction-to-case (bottom) thermal resistance	n/a	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, SPRA953.

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ELECTRICAL CHARACTERISTICS

Minimum/maximum limit specifications apply from –40°C to +85°C. Typical specifications at +25°C.
All specifications at AVDD = DVDD = VREFP = +5V, V_{CM} = 2.5V and VREFN = GND, unless otherwise noted.

PARAMETER		CONDITIONS	ADS1231 MIN	ADS1231 TYP	ADS1231 MAX	UNIT
ANALOG INPUTS						
Full-scale input voltage (AINP – AINN)				$\pm 0.5V_{REF}$ / 128		V
		V_{REF} = AVDD = 5V		±19.5		mV
		V_{REF} = AVDD = 3V		±11.7		mV
Common-mode input range			GND + 1.5		AVDD – 1.5	V
Differential input current				±2		nA
LOW-SIDE POWER SWITCH						
On-resistance (R_{ON})		AVDD = 5V, I_{SW} = 30mA		3.5	5	Ω
		AVDD = 3V, I_{SW} = 30mA		4	7	Ω
Current through switch					30	mA
SYSTEM PERFORMANCE						
Resolution		No missing codes	24			Bits
Data rate		Internal oscillator, SPEED = high		80		SPS
		Internal oscillator, SPEED = low		10		SPS
		External clock, SPEED = high		f_{CLKIN} / 61,440		SPS
		External clock, SPEED = low		f_{CLKIN} / 491,520		SPS
Digital filter settling time		Full settling		4		Conversions
Noise		f_{DATA} = 10SPS, AVDD = V_{REF} = 5V		35		nV, rms
		f_{DATA} = 80SPS, AVDD = V_{REF} = 5V		102		nV, rms
		f_{DATA} = 10SPS, AVDD = V_{REF} = 5V		232		nV, P-P
		f_{DATA} = 80SPS, AVDD = V_{REF} = 5V		622		nV, P-P
Integral nonlinearity (INL)		Differential input, end-point fit		±8		ppm
Input offset error				10		µV
Input offset drift				±20		nV/°C
Gain error				1		%
Gain drift				±2		ppm/°C
Normal-mode rejection(1)		f_{IN} = 50Hz or 60Hz ±1Hz, f_{DATA} = 10SPS, internal oscillator	80	100		dB
		f_{IN} = 50Hz or 60Hz ±1Hz, f_{DATA} = 10SPS, external clock(2)	90	110		dB
Common-mode rejection		At dc		110		dB
Power-supply rejection		At dc	90	100		dB
VOLTAGE REFERENCE INPUT						
Voltage reference input (V_{REF})		V_{REF} = VREFP – VREFN	1.5	AVDD	AVDD + 0.1	V
Negative reference input (VREFN)			GND – 0.1		VREFP – 1.5	V
Positive reference input (VREFP)			VREFN + 1.5		AVDD + 0.1	V
Voltage reference input current				10		nA
DIGITAL INPUT/OUTPUT (DVDD = 3V to 5.3V)						
Logic levels	V_{IH}		0.8 DVDD		DVDD + 0.1	V
	V_{IL}		GND		0.2 DVDD	V
	V_{OH}	I_{OH} = 500µA	DVDD – 0.4			V
	V_{OL}	I_{OL} = 500µA			0.2 DVDD	V
Input leakage		0 < $V_{DIGITAL\ INPUT}$ < DVDD			±10	µA
External clock input frequency (f_{CLKIN})			1	4.9152	6	MHz
Serial clock input frequency (f_{SCLK})					5	MHz

(1) Specification is assured by the combination of design and final test.
(2) f_{CLKIN} = 4.9152MHz.

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ELECTRICAL CHARACTERISTICS (continued)

Minimum/maximum limit specifications apply from –40°C to +85°C. Typical specifications at +25°C.
All specifications at AVDD = DVDD = VREFP = +5V, V_{CM} = 2.5V and VREFN = GND, unless otherwise noted.

PARAMETER	CONDITIONS	ADS1231			UNIT
		MIN	TYP	MAX	
POWER SUPPLY					
Power-supply voltage (AVDD, DVDD)		3		5.3	V
Analog supply current	Normal mode, AVDD = 3V		900		µA
	Normal mode, AVDD = 5V		900		µA
	Standby mode		0.1		µA
	Power-down		0.1		µA
Digital supply current	Normal mode, DVDD = 3V		60		µA
	Normal mode, DVDD = 5V		95		µA
	Standby mode, SCLK = high, DVDD = 3V		45		µA
	Standby mode, SCLK = high, DVDD = 5V		65		µA
	Power-down		0.2		µA
Power dissipation, total	Normal mode, AVDD = DVDD = 3V		2.9		mW
	Normal mode, AVDD = DVDD = 5V		5		mW
TEMPERATURE					
Operating temperature range		–40		+85	°C
Specified temperature range		–40		+85	°C

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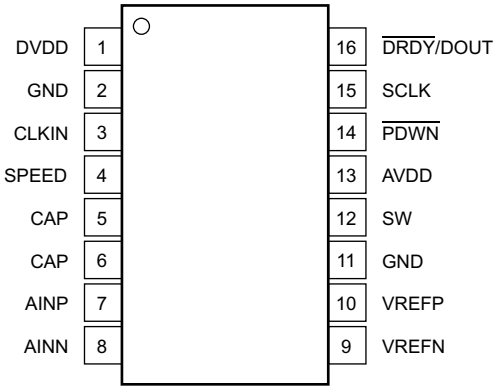
PIN CONFIGURATION

D PACKAGE
SO-16
(TOP VIEW)



PIN DESCRIPTIONS

NAME	TERMINAL	ANALOG/DIGITAL INPUT/OUTPUT	DESCRIPTION
DVDD	1	Digital	Digital power supply
GND	2	Supply	Ground for digital and analog supplies
CLKIN	3	Digital input	External clock input: typically 4.9152MHz. Tie low to activate internal oscillator.
SPEED	4	Digital input	Data rate select: SPEED: 0 → DATA RATE: 10SPS SPEED: 1 → DATA RATE: 80SPS
CAP	5	Analog	Gain amplifier bypass capacitor connection
CAP	6	Analog	Gain amplifier bypass capacitor connection
AINP	7	Analog input	Positive analog input
AINN	8	Analog input	Negative analog input
VREFN	9	Analog input	Negative reference input
VREFP	10	Analog input	Positive reference input
GND	11	Supply	Ground for digital and analog supplies
SW	12	Analog	Low-side power switch
AVDD	13	Supply	Analog power supply
$\overline{\text{PDWN}}$	14	Digital input	Power-down: holding this pin low powers down the entire converter and resets the ADC.
SCLK	15	Digital input	Serial clock: clock out data on the rising edge. Also used to initiate Standby mode. See the *Standby Mode* section for more details.
$\overline{\text{DRDY}}$/DOUT	16	Digital output	Dual-purpose output: Data ready: indicates valid data by going low. Data output: outputs data, MSB first, on the first rising edge of SCLK.

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NOISE PERFORMANCE

The ADS1231 offers outstanding noise performance. Table 1 summarizes the typical noise performance with inputs shorted externally for different data rates and voltage reference values.

The RMS and Peak-to-Peak noise are referred to the input. The effective number of bits (ENOB) is defined as:

ENOB = ln (FSR/RMS noise)/ln(2)

The Noise-Free Bits are defined as:

Noise-Free Bits = ln (FSR/Peak-to-Peak Noise)/ln(2)

Where:

FSR (Full-Scale Range) = V_{REF}/Gain.

Table 1. Noise Performance

DATA RATE	AVDD and V_{REF} (V)	RMS NOISE(1) (nV)	PEAK-TO-PEAK NOISE(1) (nV)	ENOB (RMS)	NOISE-FREE BITS
10	5	35.2	231.9	20.1	17.4
	3	33.5	199.2	19.4	16.8
80	5	102.1	622.1	18.5	15.9
	3	80.3	549.6	18.2	15.4

(1) Noise specifications are based on direct measurement of 1024 consecutive samples.

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TYPICAL CHARACTERISTICS

At T_A = +25°C, AVDD = DVDD = REFP = 5V, REFN = GND, and V_{CM} = 2.5V unless otherwise noted.

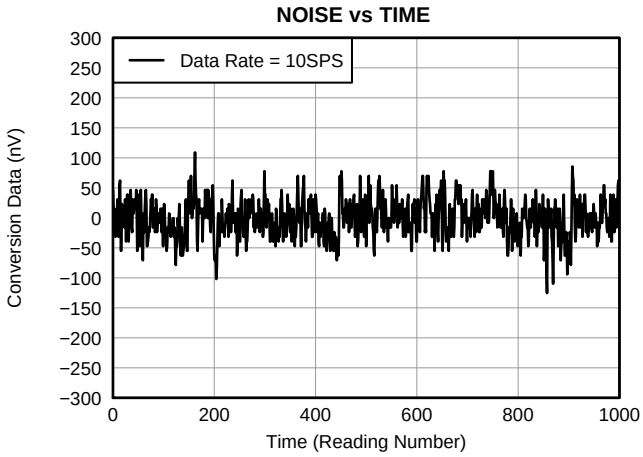

Figure 1.

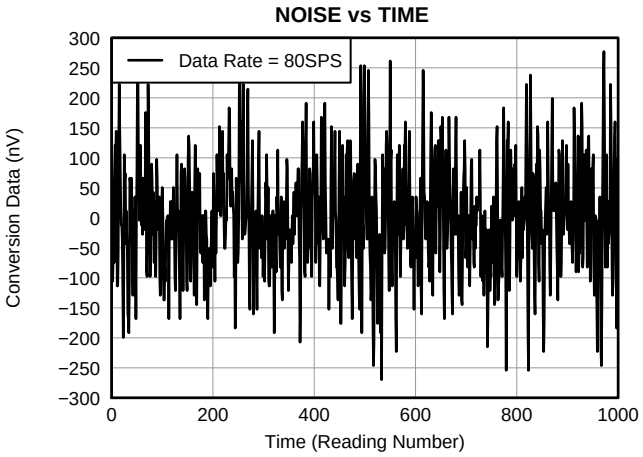

Figure 2.

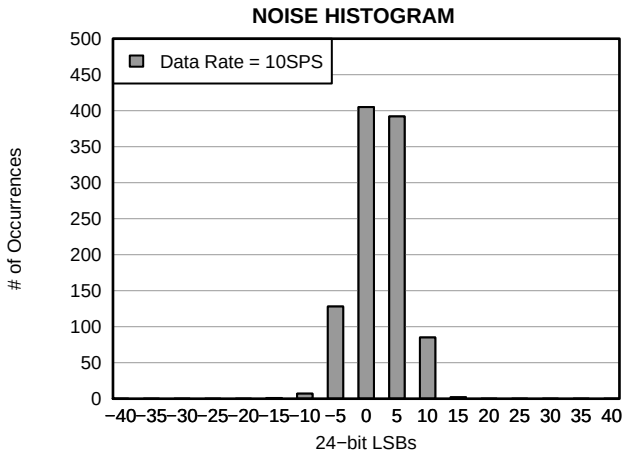

Figure 3.

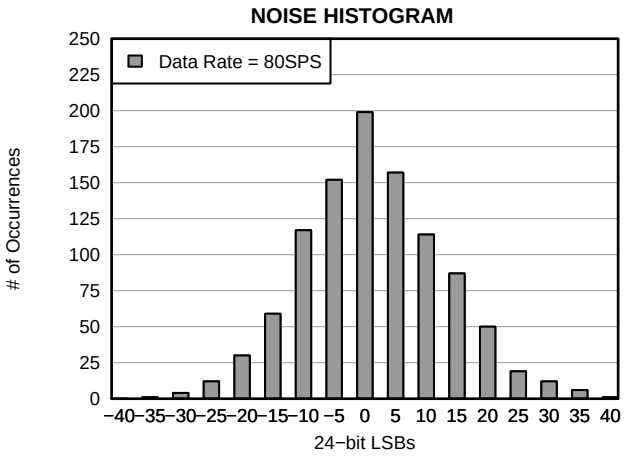

Figure 4.

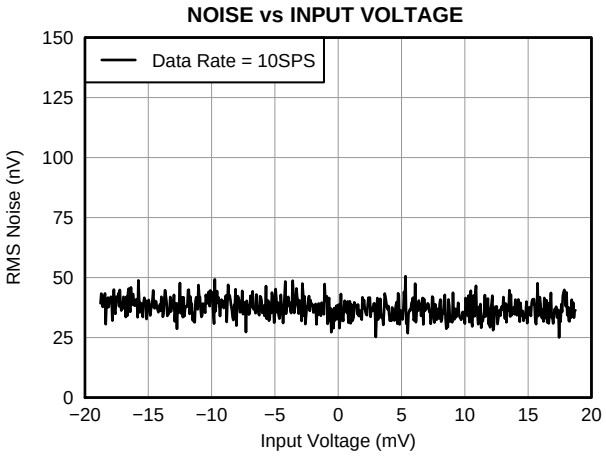

Figure 5.

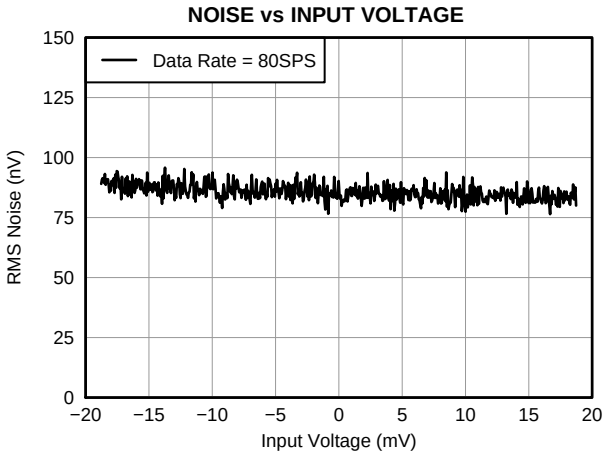

Figure 6.

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TYPICAL CHARACTERISTICS (continued)

At T_A = +25°C, AVDD = DVDD = REFP = 5V, REFN = GND, and V_{CM} = 2.5V unless otherwise noted.

OFFSET DRIFT vs TEMPERATURE

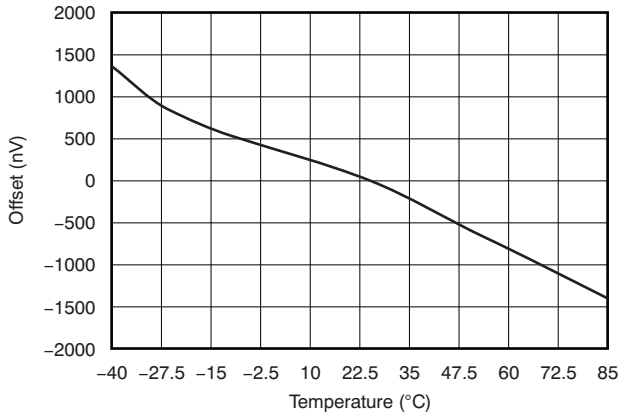

Figure 7.

GAIN ERROR vs TEMPERATURE

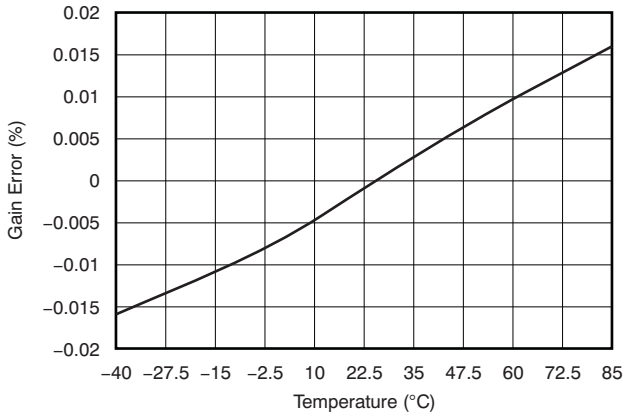

Figure 8.

INL vs INPUT VOLTAGE

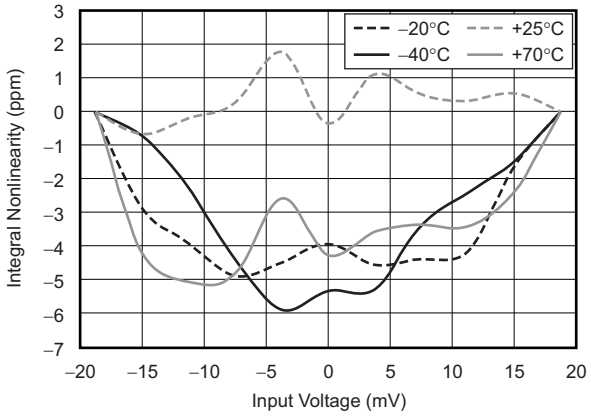

Figure 9.

DATA RATE vs TEMPERATURE

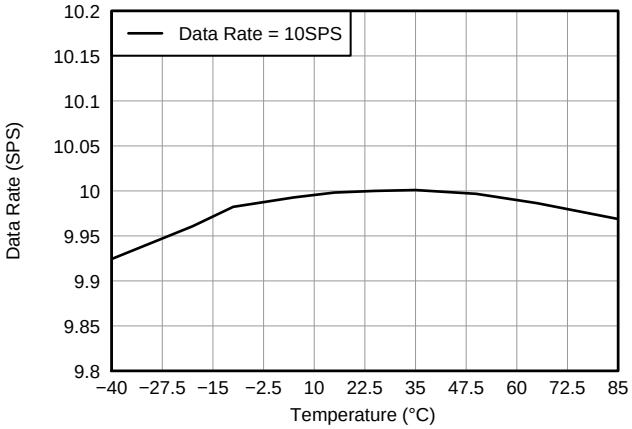

Figure 10.

ANALOG SUPPLY CURRENT vs TEMPERATURE

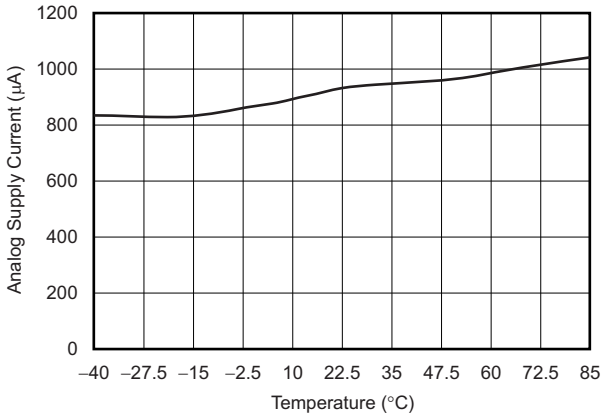

Figure 11.

DIGITAL SUPPLY CURRENT vs TEMPERATURE

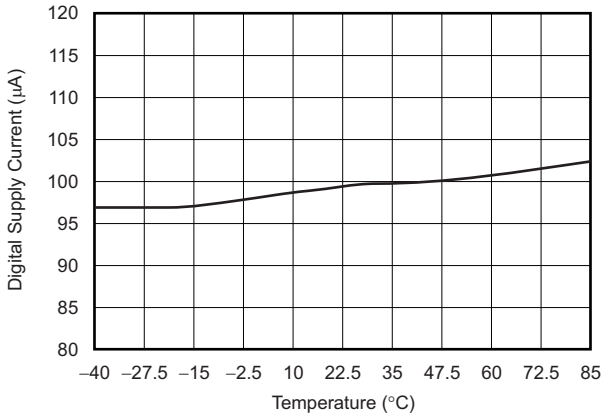

Figure 12.

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OVERVIEW

The ADS1231 is a precision, 24-bit ADC that includes a low-noise PGA, internal oscillator, third-order delta-sigma (ΔΣ) modulator, and fourth-order digital filter. The ADS1231 provides a complete front-end solution for bridge sensor applications such as weigh scales, strain gauges, and pressure sensors.

Data can be output at 10SPS for excellent 50Hz and 60Hz rejection, or at 80SPS when higher speeds are needed. The ADS1231 is easy to configure, and all digital control is accomplished through dedicated pins; there are no registers to program. A simple two-wire serial interface retrieves the data.

ANALOG INPUTS (AINP, AINN)

The input signal to be measured is applied to the input pins AINP and AINN. The ADS1231 accepts differential input signals, but can also measure unipolar signals.

LOW-NOISE AMPLIFIER

The ADS1231 features a low-drift, low-noise amplifier that provides a complete front-end solution for bridge sensors. A simplified diagram of the amplifier is shown in Figure 13. It consists of two chopper-stabilized amplifiers (A1 and A2) and three accurately matched resistors (R_1, R_{F1}, and R_{F2}) that construct a differential front-end stage with a gain of 128, followed by gain stage A3 (Gain = 1). The inputs are equipped with an EMI filter, as shown in Figure 13. The cutoff frequency of the EMI filter is 20MHz. By using AVDD as the reference input, the bipolar input ranges from –19.5mV to +19.5mV. The inputs of the ADS1231 are protected with internal diodes connected to the power-supply rails. These diodes clamp the applied signal to prevent it from damaging the input circuitry.

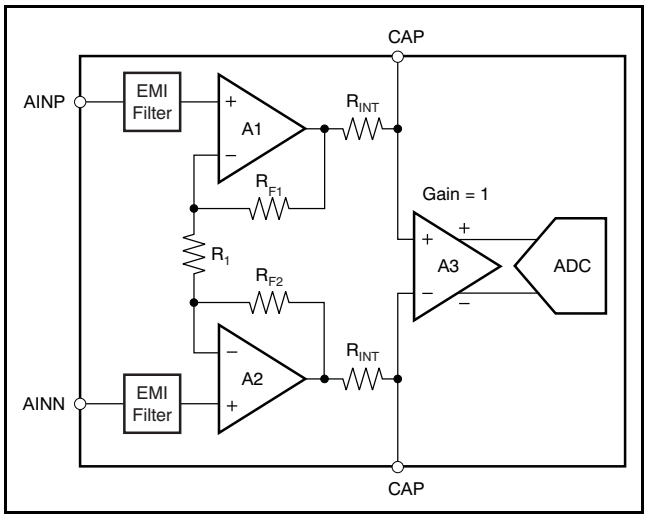

Figure 13. Simplified Diagram of the Amplifier

External Capacitor

An external capacitor (C_{EXT}) across the two ADS1231 CAP pins combines with the internal resistor R_{INT} (on-chip) to create a low-pass filter. The recommended value for C_{EXT} is 0.1μF which provides a corner frequency of 720Hz. This low-pass filter serves two purposes. First, the input signal is band-limited to prevent aliasing by the ADC and to filter out the high-frequency noise. Second, it attenuates the chopping residue from the amplifier to improve temperature drift performance. NPO or C0G capacitors are recommended. For optimal performance, place the external capacitor very close to the CAP pins.

VOLTAGE REFERENCE INPUTS (VREFP, VREFN)

The voltage reference used by the modulator is generated from the voltage difference between VREFP and VREFN: V_{REF} = VREFP – VREFN. The reference inputs use a structure similar to that of the analog inputs. In order to increase the reference input impedance, switching buffer circuitry is used to reduce the input equivalent capacitance. The reference drift and noise impact ADC performance. In order to achieve best results, pay close attention to the reference noise and drift specifications. A simplified diagram of the circuitry on the reference inputs is shown in Figure 14. The switches and capacitors can be modeled approximately using an effective impedance of Z_{EFF} = 500MΩ.

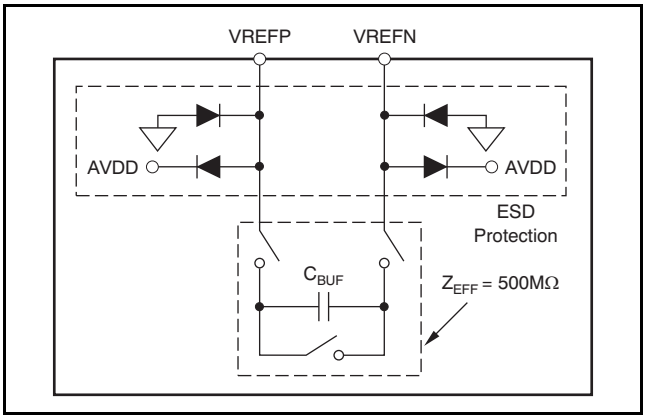

Figure 14. Simplified Reference Input Circuitry

ESD diodes protect the reference inputs. To prevent these diodes from turning on, make sure the voltages on the reference pins do not go below GND by more than 100mV, and likewise, do not exceed AVDD by 100mV:

GND – 100mV < (VREFP or VREFN) < AVDD + 100mV

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LOW-SIDE POWER SWITCH (SW)

The ADS1231 incorporates an internal switch for use with an external bridge sensor, as shown in Figure 15. The switch can be used in a return path for the bridge power. By opening the switch, power dissipation in the bridge is eliminated.

The switch is controlled by the ADS1231 conversion status. During normal conversions, the switch is closed (the SW pin is connected to GND). During standby or power-down modes, the switch is opened (the SW pin is high impedance). When using the switch, it is recommended that the negative reference input (VREFN) be connected directly to the bridge ground terminal, as shown in Figure 15 for best performance.

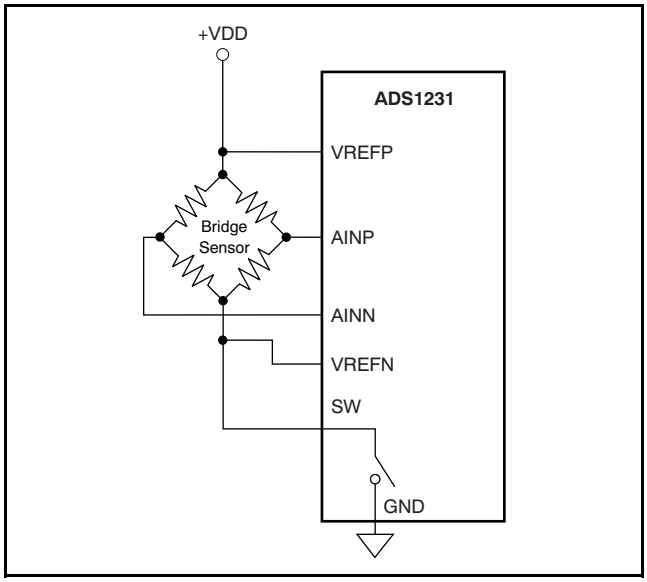

Figure 15. Low-Side Power Switch

CLOCK SOURCE

The ADS1231 can use the internal oscillator or an external clock source to accommodate a wide variety of applications. Figure 16 shows the equivalent circuitry of the clock module. The CLK_DETECT block determines whether an external clock signal is applied to the CLKIN pin so that the internal oscillator is bypassed or activated. When the CLKIN pin frequency is above ~200kHz, the CLK_DETECT circuit shuts down the internal oscillator and passes the external clock signal to the ADC. When the CLKIN pin frequency is below ~200kHz, the CLK_DETECT block activates the internal oscillator. When the internal oscillator is chosen, make sure to connect the CLKIN pin to GND.

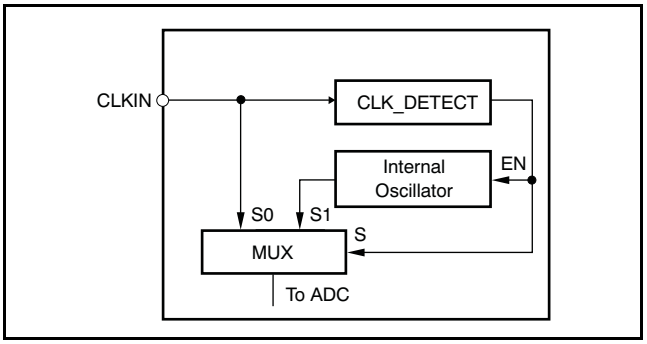

Figure 16. Equivalent Circuitry of the Clock Source

The allowable frequency range for the external clock signal f_{CLKIN} is specified in the Electrical Characteristics table.

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FREQUENCY RESPONSE

The ADS1231 uses a sinc^4 digital filter with the frequency response shown in Figure 17 for f_{CLKIN} = 4.9152MHz. The frequency response repeats at multiples of the modulator sampling frequency of 76.8kHz. The overall response is that of a low-pass filter with a –3dB cutoff frequency of 3.32Hz with the SPEED pin tied low (10SPS data rate) and 11.64Hz with the SPEED pin tied high (80SPS data rate).

To help see the response at lower frequencies, Figure 17(a) illustrates the nominal response out to 100Hz, when the data rate = 10SPS. Notice that signals at multiples of 10Hz are rejected, and therefore simultaneous rejection of 50Hz and 60Hz is achieved.

The benefit of using a sinc^4 filter is that every frequency notch has four zeros on the same location, thus providing excellent normal-mode rejection of line-cycle interference.

Figure 17(b) zooms in on the 50Hz and 60Hz notches with the SPEED pin tied low (10SPS data rate).

The ADS1231 data rate and frequency response scale directly with clock frequency. For example, if f_{CLKIN} increases from 4.9152MHz to 5.5296MHz when the SPEED pin is tied high, the data rate increases from 80SPS to 90SPS, while the notch also increases from 80Hz to 90Hz. Note that these changes are only possible when an external clock source is applied.

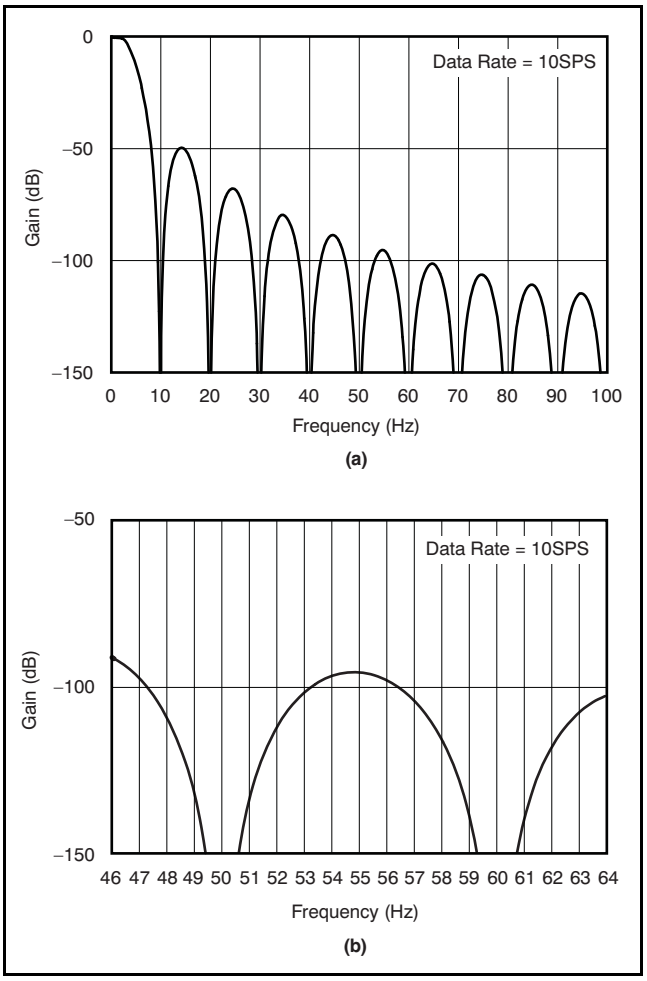

Figure 17. Nominal Frequency Response Out To 100Hz

SETTLING TIME

Fast changes in the input signal require time to settle. For example, an external multiplexer in front of the ADS1231 can generate abrupt changes in input voltage by simply switching the multiplexer input channels. These sorts of changes in the input require four data conversion cycles to settle. When continuously converting, five readings may be necessary in order to settle the data. If the change in input occurs in the middle of the first conversion, four more full conversions of the fully-settled input are required to obtain fully-settled data. Discard the first four readings because they contain only partially-settled data. Figure 18 illustrates the settling time for the ADS1231.

DATA RATE

The ADS1231 data rate is set by the SPEED pin, as shown in Table 2. When SPEED is low, the data rate is nominally 10SPS. This data rate provides the lowest noise, and also has excellent rejection of both 50Hz and 60Hz line-cycle interference. For applications requiring fast data rates, setting SPEED high selects a data rate of nominally 80SPS.

Table 2. Data Rate Settings

SPEED PIN	DATA RATE	
	Internal Oscillator	External Clock
0	10SPS	f_{CLKIN} / 491,520
1	80SPS	f_{CLKIN} / 61,440

DATA FORMAT

The ADS1231 outputs 24 bits of data in binary twos complement format. The least significant bit (LSB) has a weight of $(0.5V_{REF}/128)(2^{23} - 1)$. The positive full-scale input produces an output code of 7FFFFFh and the negative full-scale input produces an output code of 800000h. The output clips at these codes for signals exceeding full-scale. Table 3 summarizes the ideal output codes for different input signals.

Table 3. Ideal Output Code vs Input Signal

INPUT SIGNAL V_{IN} (AINP – AINN)	IDEAL OUTPUT
≥ $+0.5V_{REF}/128$	7FFFFFh
$(+0.5V_{REF}/128)/(2^{23} - 1)$	000001h
0	000000h
$(-0.5V_{REF}/128)/(2^{23} - 1)$	FFFFFFh
≤ $-0.5V_{REF}/128$	800000h

1. Excludes effects of noise, INL, offset, and gain errors.

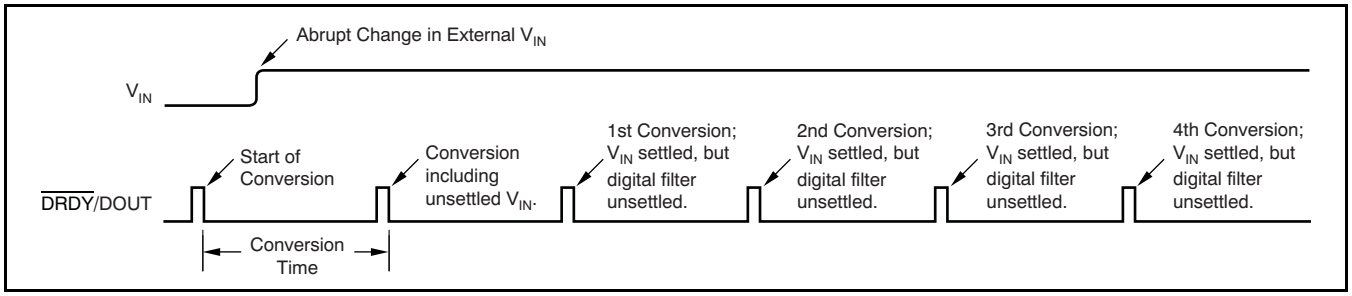

Figure 18. Settling Time in Continuous Conversion Mode

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DATA READY/DATA OUTPUT (DRDY/DOUT)

This digital output pin serves two purposes. First, it indicates when new data are ready by going low. Afterwards, on the first rising edge of SCLK, the DRDY/DOUT pin changes function and begins outputting the conversion data, most significant bit (MSB) first. Data are shifted out on each subsequent SCLK rising edge. After all 24 bits have been retrieved, the pin can be forced high with an additional SCLK. It then stays high until new data are ready. This configuration is useful when polling on the status of DRDY/DOUT to determine when to begin data retrieval.

SERIAL CLOCK INPUT (SCLK)

This digital input shifts serial data out with each rising edge. This input has built-in hysteresis, but care should still be taken to ensure a clean signal. Glitches or slow-rising signals can cause unwanted additional shifting. For this reason, it is best to make sure the rise and fall times of SCLK are both less than 50ns.

DATA RETRIEVAL

The ADS1231 continuously converts the analog input signal. To retrieve data, wait until DRDY/DOUT goes low, as shown in Figure 19. After DRDY/DOUT goes low, begin shifting out the data by applying SCLKs. Data are shifted out MSB first. It is not required to shift out all 24 bits of data, but the data must be retrieved before new data are updated (within t_{CONV}) or else the data will be overwritten. Avoid data retrieval during the update period (t_{UPDATE}). If only 24 SCLKs have been applied, DRDY/DOUT remains at the state of the last bit shifted out until it is taken high (see t_{UPDATE}), indicating that new data are being updated. To avoid having DRDY/DOUT remain in the state of the last bit, the 25th SCLK can be applied to force DRDY/DOUT high, as shown in Figure 20. This technique is useful when a host controlling the device is polling DRDY/DOUT to determine when data are ready.

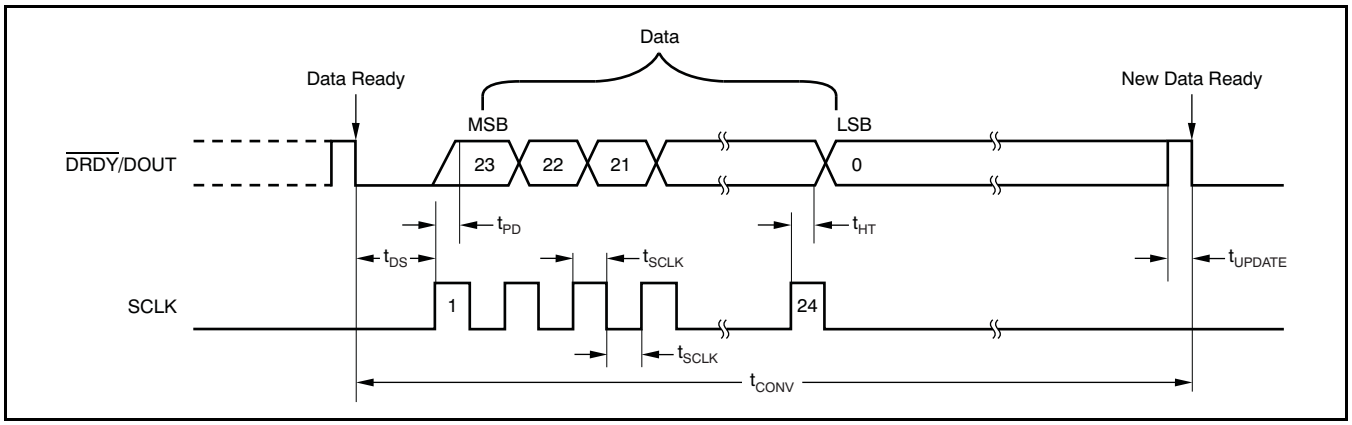

Figure 19. 24-Bit Data Retrieval Timing

SYMBOL	DESCRIPTION		MIN	TYP	MAX	UNITS
t_{DS}	DRDY/DOUT low to first SCLK rising edge		0			ns
t_{SCLK}	SCLK positive or negative pulse width		100			ns
t_{PD} (1)	SCLK rising edge to new data bit valid: propagation delay				50	ns
t_{HT} (1)	SCLK rising edge to old data bit valid: hold time		20			ns
t_{UPDATE}	Data updating: no readback allowed			90		µs
t_{CONV}	Conversion time (1/data rate)	SPEED = 1		12.5		ms
		SPEED = 0		100		ms

(1) Minimum required from simulation.

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STANDBY MODE

Standby mode dramatically reduces power consumption by shutting down most of the circuitry. To enter Standby mode, simply hold SCLK high after DRDY/DOUT goes low; see Figure 21. Standby mode can be initiated at any time during readback; it is not necessary to retrieve all 24 bits of data beforehand.

When $t_{STANDBY}$ has passed with SCLK held high, Standby mode activates. DRDY/DOUT stays high when Standby mode begins. SCLK must remain high to stay in Standby mode. To exit Standby mode (wake up), set SCLK low. The first data after exiting Standby mode are valid.

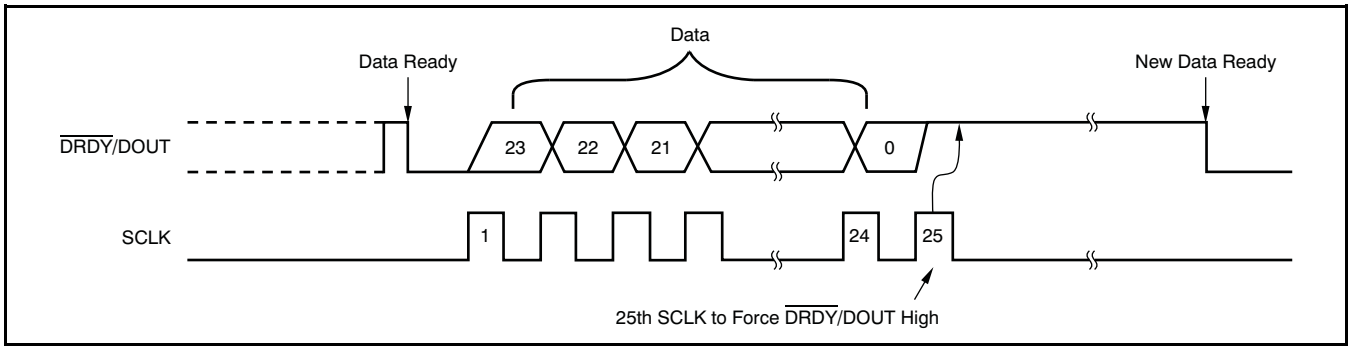

Figure 20. Data Retrieval with DRDY/DOUT Forced High Afterwards

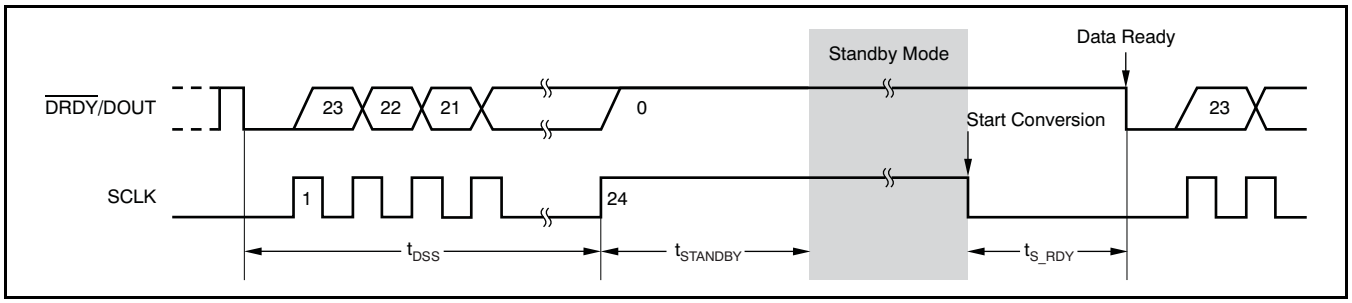

Figure 21. Standby Mode Timing (Can be used for single conversions)

SYMBOL	DESCRIPTION		MIN	TYP	MAX	UNITS
t_{DSS} (1)	SCLK high after DRDY/DOUT goes low to activate Standby mode	SPEED = 1			12.44	ms
		SPEED = 0			99.94	ms
$t_{STANDBY}$	Standby mode activation time	SPEED = 1	12.5			ms
		SPEED = 0	100			ms
t_{S_RDY} (1)	Data ready after exiting Standby mode	SPEED = 1		52.6		ms
		SPEED = 0		401.8		ms

(1) Based on an ideal internal oscillator.

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POWER-DOWN MODE

Power-Down mode shuts down the entire ADC circuitry and reduces the total power consumption close to zero. To enter Power-Down mode, simply hold the $\overline{\text{PDWN}}$ pin low. Power-Down mode also resets the entire circuitry. Power-Down mode can be initiated at any time during readback; it is not necessary to retrieve all 24 bits of data beforehand. Figure 23 shows the wake-up timing from Power-Down mode.

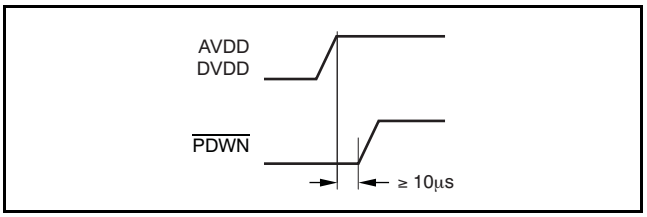

Figure 22. Power-Up Timing Sequence

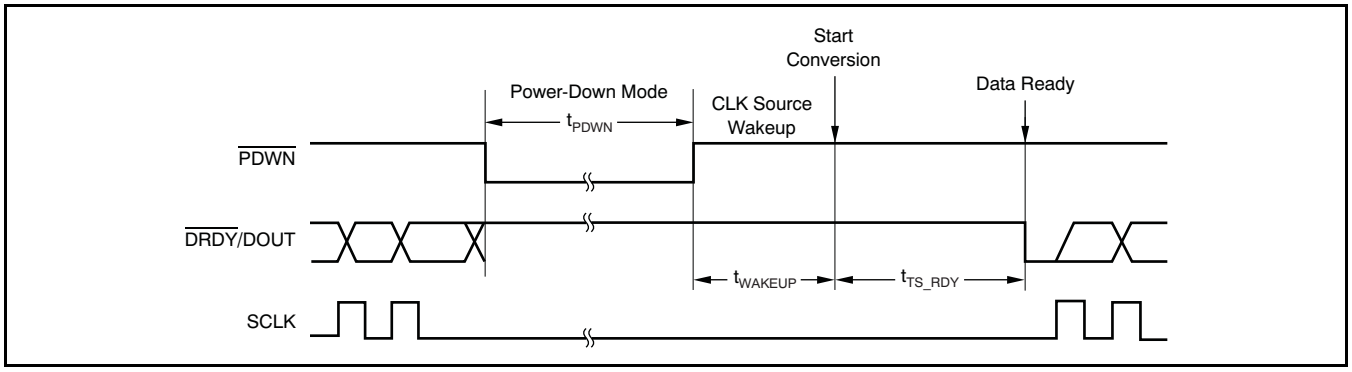

Figure 23. Wake-Up Timing from Power-Down Mode

SYMBOL	DESCRIPTION	MIN	TYP	UNITS
t_{WAKEUP} (1)(2)	Wake-up time after Power-Down mode		7.95	µs
t_{PDWN} (1)	$\overline{\text{PDWN}}$ pulse width	26		µs

(1) Based on an ideal internal oscillator.
(2) Typical required from simulation.

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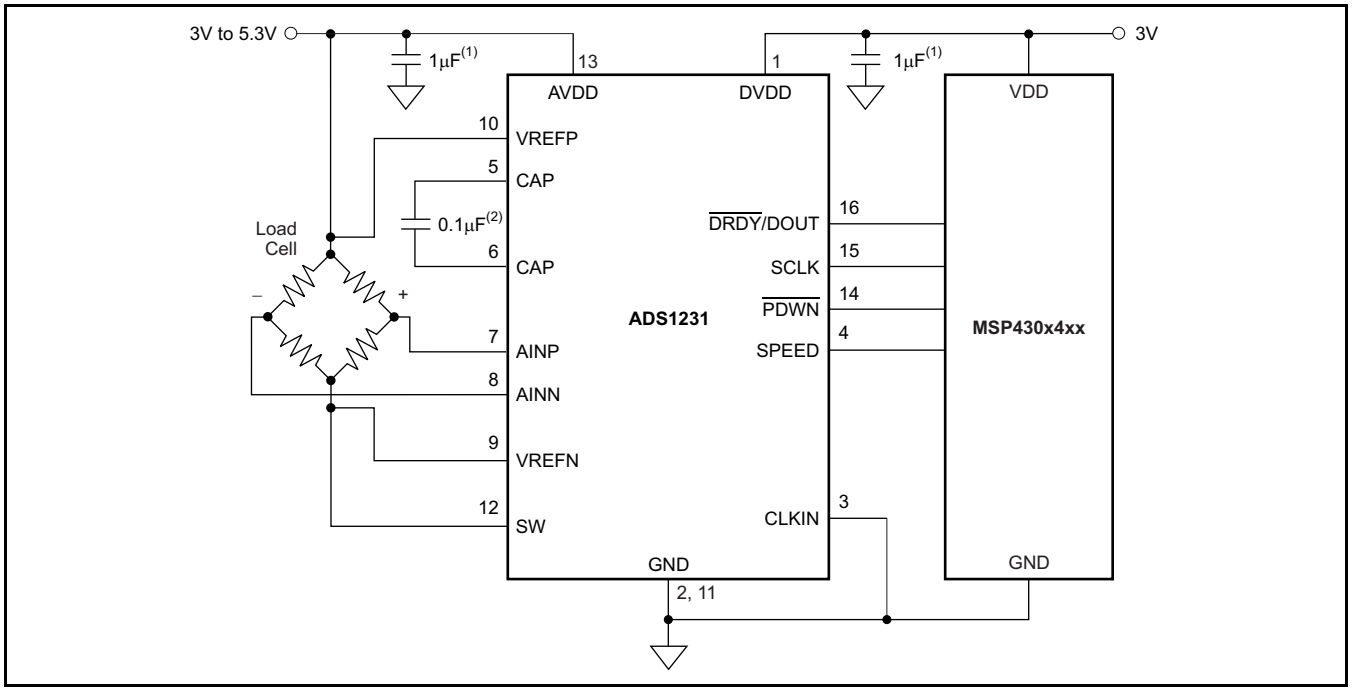
APPLICATION EXAMPLE

Weigh Scale System

Figure 24 shows a typical ADS1231 application as part of a weigh scale system.



(1) Place a 0.1µF or higher capacitor as close as possible on both AVDD and DVDD.

(2) Place capacitor very close to the ADS1231 CAP pins for optimal performance.

Figure 24. Weigh Scale Example

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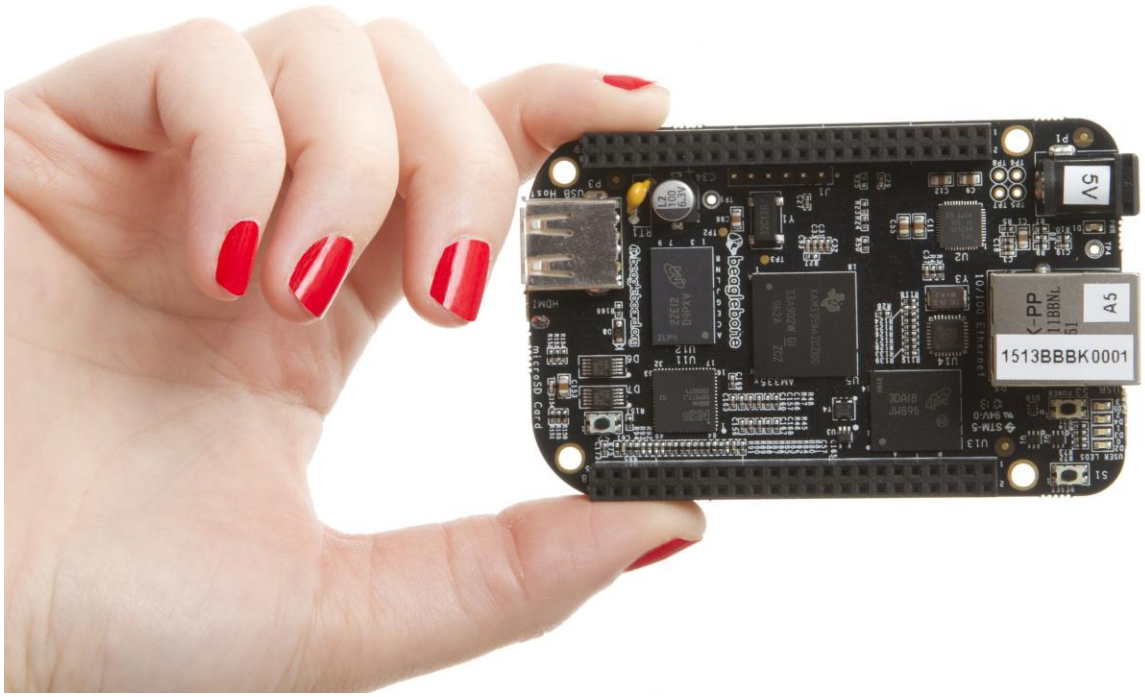
3.3. Beaglebone Black



BeagleBone Black System Reference Manual

Revision C.1
May 22, 2014

Author: Gerald Coley
gerald@beagleboard.org

Contributing Editor: Robert P J Day

4.0 BeagleBone Black Overview

The BeagleBone Black is the latest addition to the BeagleBoard.org family and like its predecessors, is designed to address the Open Source Community, early adopters, and anyone interested in a low cost ARM Cortex-A8 based processor.

It has been equipped with a minimum set of features to allow the user to experience the power of the processor and is not intended as a full development platform as many of the features and interfaces supplied by the processor are not accessible from the BeagleBone Black via onboard support of some interfaces. It is not a complete product designed to do any particular function. It is a foundation for experimentation and learning how to program the processor and to access the peripherals by the creation of your own software and hardware.

It also offers access to many of the interfaces and allows for the use of add-on boards called capes, to add many different combinations of features. A user may also develop their own board or add their own circuitry.

BeagleBone Black is manufactured and warranted by Circuitco LLC in Richardson Texas for the benefit of the community and its supporters. In addition, Circuitco provides the RMA support for the BeagleBone Black.

Jason Kridner of Texas Instruments handles the community promotions and is the spokesman for BeagleBoard.org.

The board is designed by Gerald Coley, an employee of Texas Instruments and a charter member of the BeagleBoard.org community.

The PCB layout was done by Circuitco and Circuitco is the sole funder of its development and transition to production.

The Software is written and supported by the thousands of community members, including Jason Kridner, employees of Texas Instruments, DigiKey, and Circuitco.
.

4.1 BeagleBone Compatibility

The board is intended to be compatible with the original BeagleBone as much as possible. There are several areas where there are differences between the two designs. These differences are listed below, along with the reasons for the differences.

- Sitara AM3358BZCZ100, 1GHZ, processor.
  - Sorry, we just had to make it faster.
- 512MB DDR3L
  - Cost reduction
  - Performance boost
  - Memory size increase
  - Lower power
- No Serial port by default.
  - Cost reduction
  - Can be added by buying a TTL to USB Cable that is widely available
  - Single largest cost reduction action taken
- No JTAG emulation over USB.
  - Cost reduction. JTAG header is not populated, but can easily be mounted.
- EEPROM Reduced from 32KB to 4KB
  - Cost Reduction
- Onboard Managed NAND (eMMC)
  - 4GB
  - Cost reduction
  - Performance boost x8 vs. x4 bits
  - Performance boost due to deterministic properties vs. microSD card
- GPMC bus may not be accessible from the expansion headers in some cases
  - Result of eMMC on the main board
  - Signals are still routed to the expansion connector
  - If eMMC is not used, signals can be used via expansion if eMMC is held in reset
- There may be 10 less GPIO pins available
  - Result of eMMC
  - If eMMC is not used, could still be used
- The power expansion header, for battery and backlight, has been removed
  - Cost reduction, space reduction
  - Four pins were added to provide access to the battery charger function.
- HDMI interface onboard
  - Feature addition
  - Audio and video capable
  - Micro HDMI
- No three function USB cable
  - Cost reduction
- GPIO3_21 has a 24.576 MHZ clock on it.

- This is required by the HDMI Framer for Audio purposes. We needed to run a clock into the processor to generate the correct clock frequency. The pin on the processor was already routed to the expansion header. In order not to remove this feature on the expansion header, it was left connected. In order to use the pin as a GPIO pin, you need to disable the clock. While this disables audio to the HDMI, the fact that you want to use this pin for something else, does the same thing.

- This is required by the HDMI Framer for Audio purposes. We needed to run a clock into the processor to generate the correct clock frequency. The pin on the processor was already routed to the expansion header. In order not to remove this feature on the expansion header, it was left connected. In order to use the pin as a GPIO pin, you need to disable the clock. While this disables audio to the HDMI, the fact that you want to use this pin for something else, does the same thing.

4.2 BeagleBone Black Features and Specification

This section covers the specifications and features of the board and provides a high level description of the major components and interfaces that make up the board.

Table 2 provides a list of the features.

Table 2. BeagleBone Black Features

	Feature	
Processor	Sitara AM3358BZCZ100 1GHz, 2000 MIPS	
Graphics Engine	SGX530 3D, 20M Polygons/S	
SDRAM Memory	512MB DDR3L 800MHZ	
Onboard Flash	4GB, 8bit Embedded MMC	
PMIC	TPS65217C PMIC regulator and one additional LDO.	
Debug Support	Optional Onboard 20-pin CTI JTAG, Serial Header	
Power Source	miniUSB USB or DC Jack	5VDC External Via Expansion Header
PCB	3.4" x 2.1"	6 layers
Indicators	1-Power, 2-Ethernet, 4-User Controllable LEDs	
HS USB 2.0 Client Port	Access to USB0, Client mode via miniUSB	
HS USB 2.0 Host Port	Access to USB1, Type A Socket, 500mA LS/FS/HS	
Serial Port	UART0 access via 6 pin 3.3V TTL Header. Header is populated	
Ethernet	10/100, RJ45	
SD/MMC Connector	microSD , 3.3V	
User Input	Reset Button Boot Button Power Button	
Video Out	16b HDMI, 1280x1024 (MAX) 1024x768,1280x720,1440x900 ,1920x1080@24Hz w/EDID Support	
Audio	Via HDMI Interface, Stereo	
Expansion Connectors	Power 5V, 3.3V , VDD_ADC(1.8V) 3.3V I/O on all signals McASP0, SPI1, I2C, GPIO(69 max), LCD, GPMC, MMC1, MMC2, 7 AIN(**1.8V MAX**), 4 Timers, 4 Serial Ports, CAN0, EHRPWM(0,2),XDMA Interrupt, Power button, Expansion Board ID (Up to 4 can be stacked)	
Weight	1.4 oz (39.68 grams)	
Power	Refer to Section 6.1.7	

4.3 Board Component Locations

This section describes the key components on the board. It provides information on their location and function. Familiarize yourself with the various components on the board.

4.3.1 Connectors, LEDs, and Switches

Figure 17 below shows the locations of the connectors, LEDs, and switches on the PCB layout of the board.

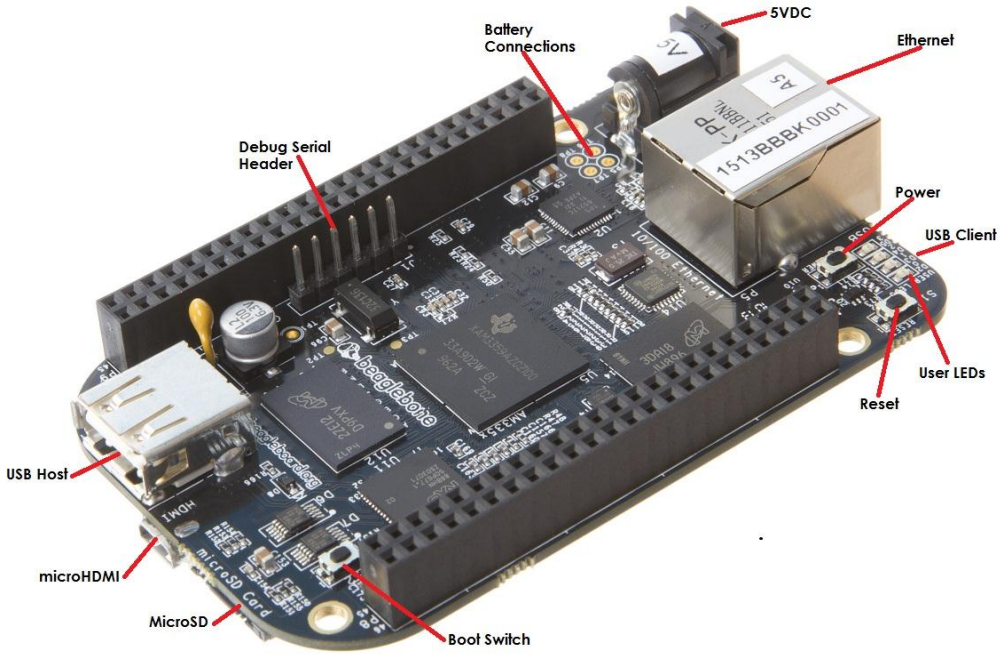


Figure 17. Connectors, LEDs and Switches

- **DC Power** is the main DC input that accepts 5V power.
- **Power Button** alerts the processor to initiate the power down sequence and is used to power down the board.
- **10/100 Ethernet** is the connection to the LAN.
- **Serial Debug** is the serial debug port.
- **USB Client** is a miniUSB connection to a PC that can also power the board.
- **BOOT switch** can be used to force a boot from the microSD card if the power is cycled on the board, removing power and reapplying the power to the board..
- There are four blue **LED**S that can be used by the user.
- **Reset Button** allows the user to reset the processor.
- **microSD** slot is where a microSD card can be installed.
- **microHDMI** connector is where the display is connected to.
- **USB Host** can be connected different USB interfaces such as Wi-Fi, BT, Keyboard, etc.

4.3.2 Key Components

Figure 18 below shows the locations of the key components on the PCB layout of the board.

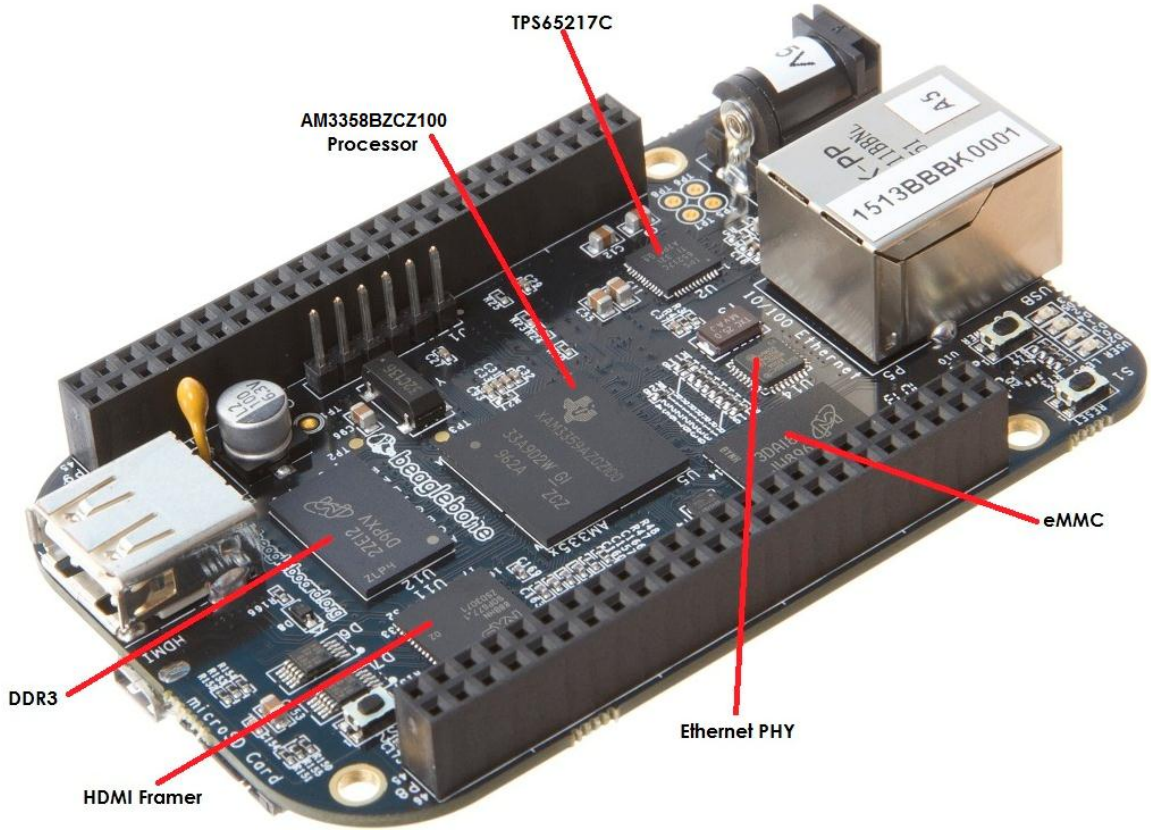


Figure 18. Key Components

- **Sitara AM3358BZCZ100** is the processor for the board.
- **Micron 512MB DDR3L** or **Kingston 512mB DDR3** is the Dual Data Rate RAM memory.
- **TPS65217C PMIC** provides the power rails to the various components on the board.
- **SMSC Ethernet PHY** is the physical interface to the network.
- **Micron eMMC** is an onboard MMC chip that holds up to 4GB of data.
- **HDMI** Framer provides control for an HDMI or DVI-D display with an adapter.

9.2 Silkscreen and Component Locations

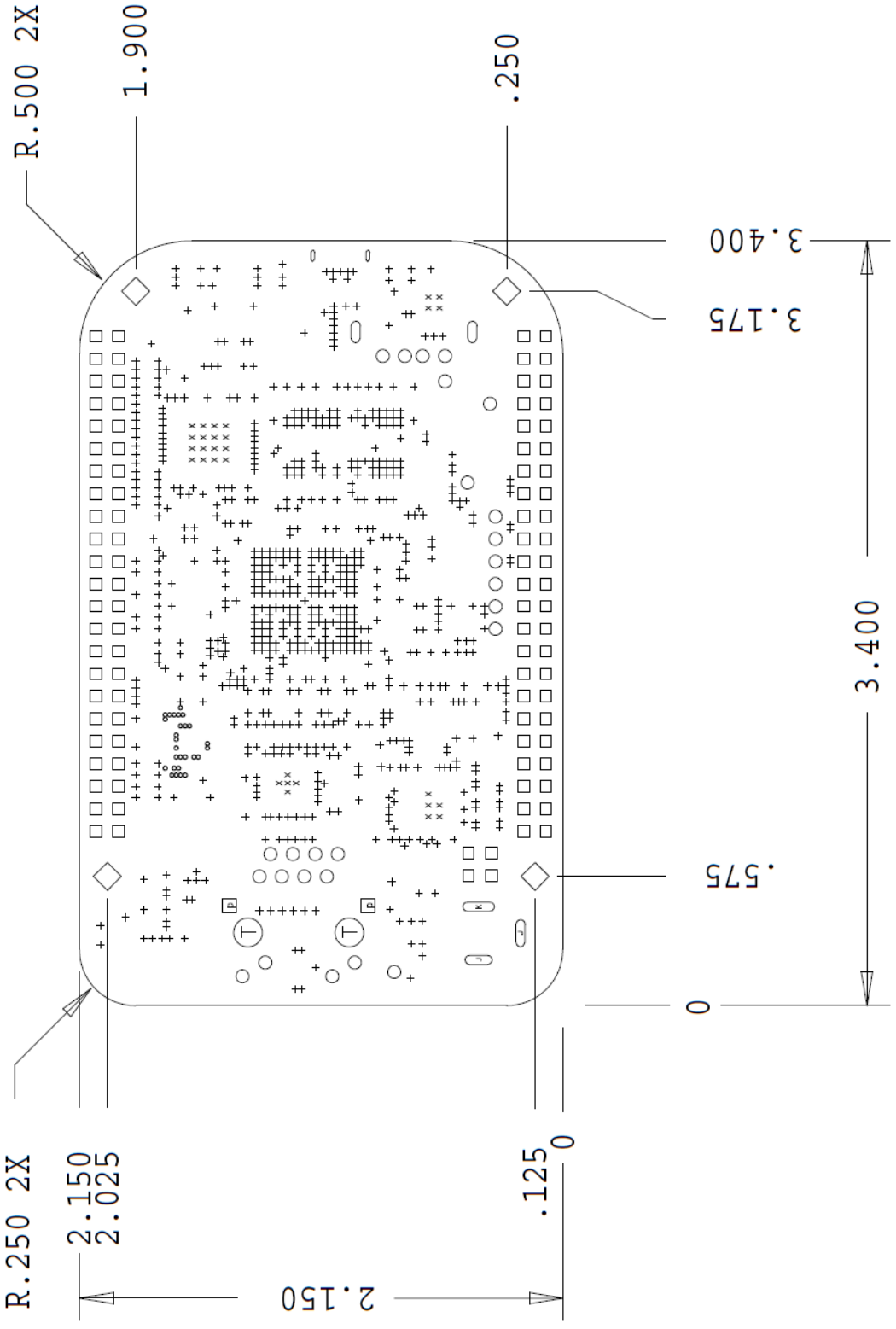


Figure 71. Board Dimensions

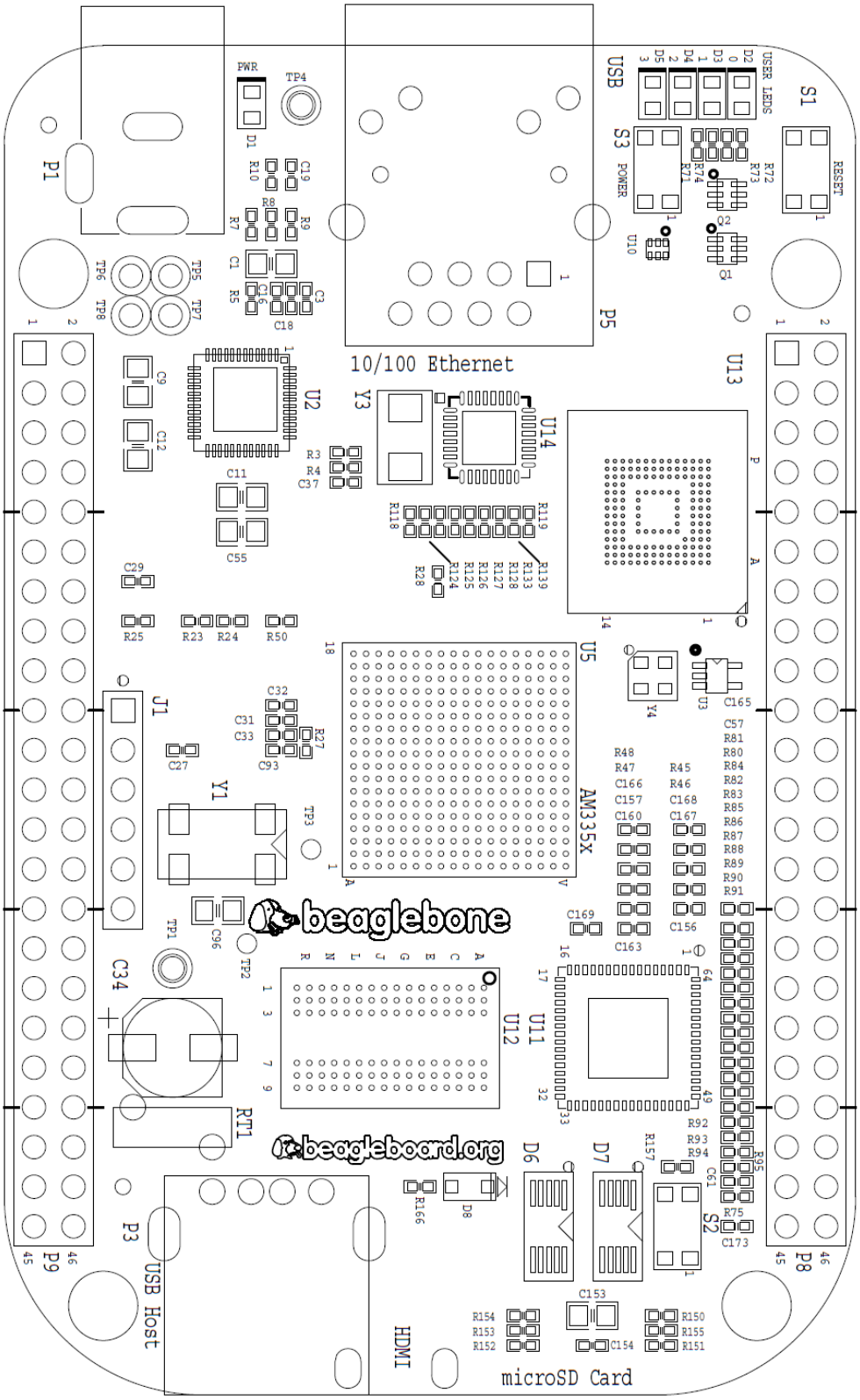


Figure 72. Component Side Silkscreen

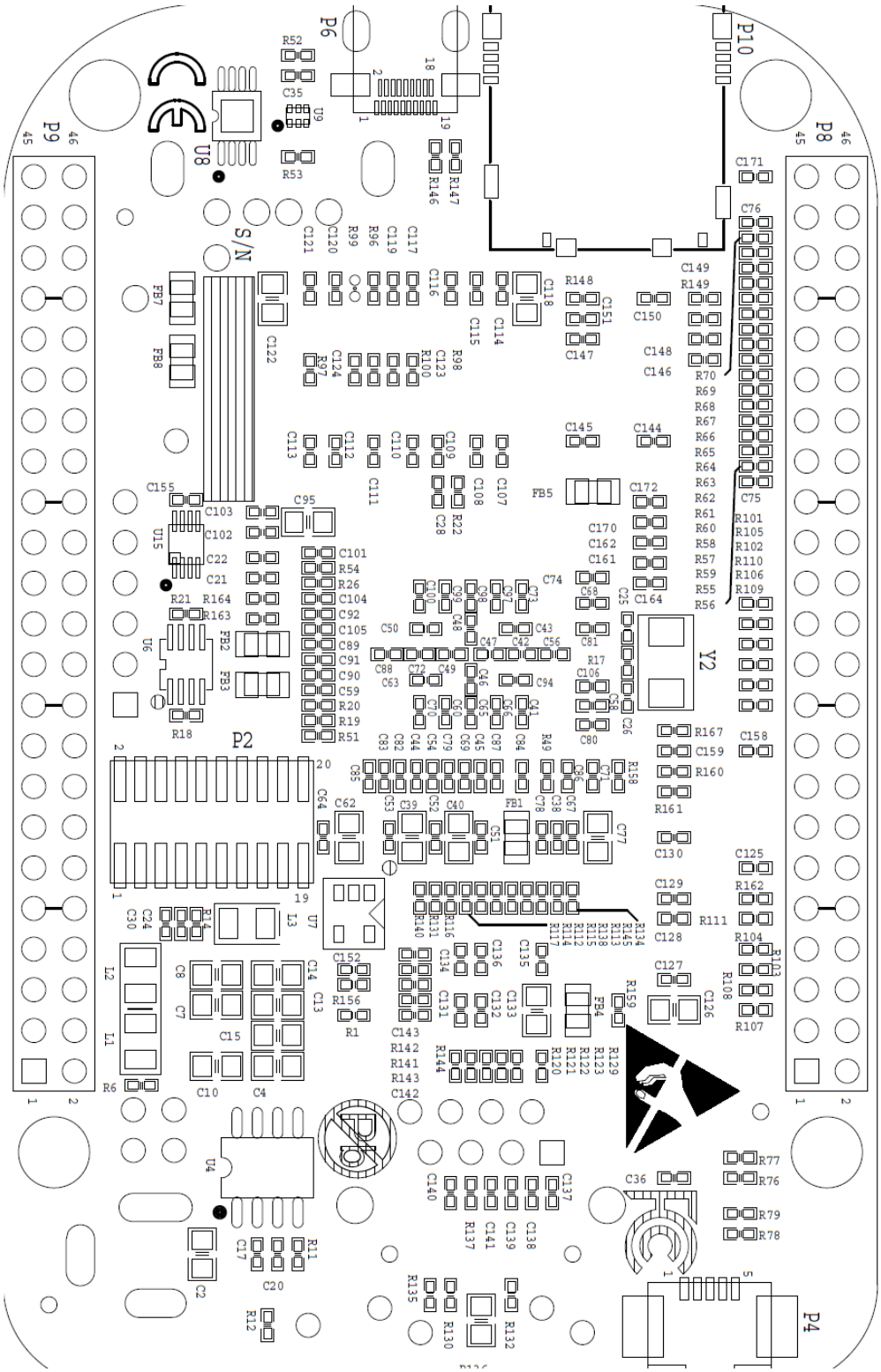


Figure 73. Circuit Side Silkscreen

10.0 Pictures

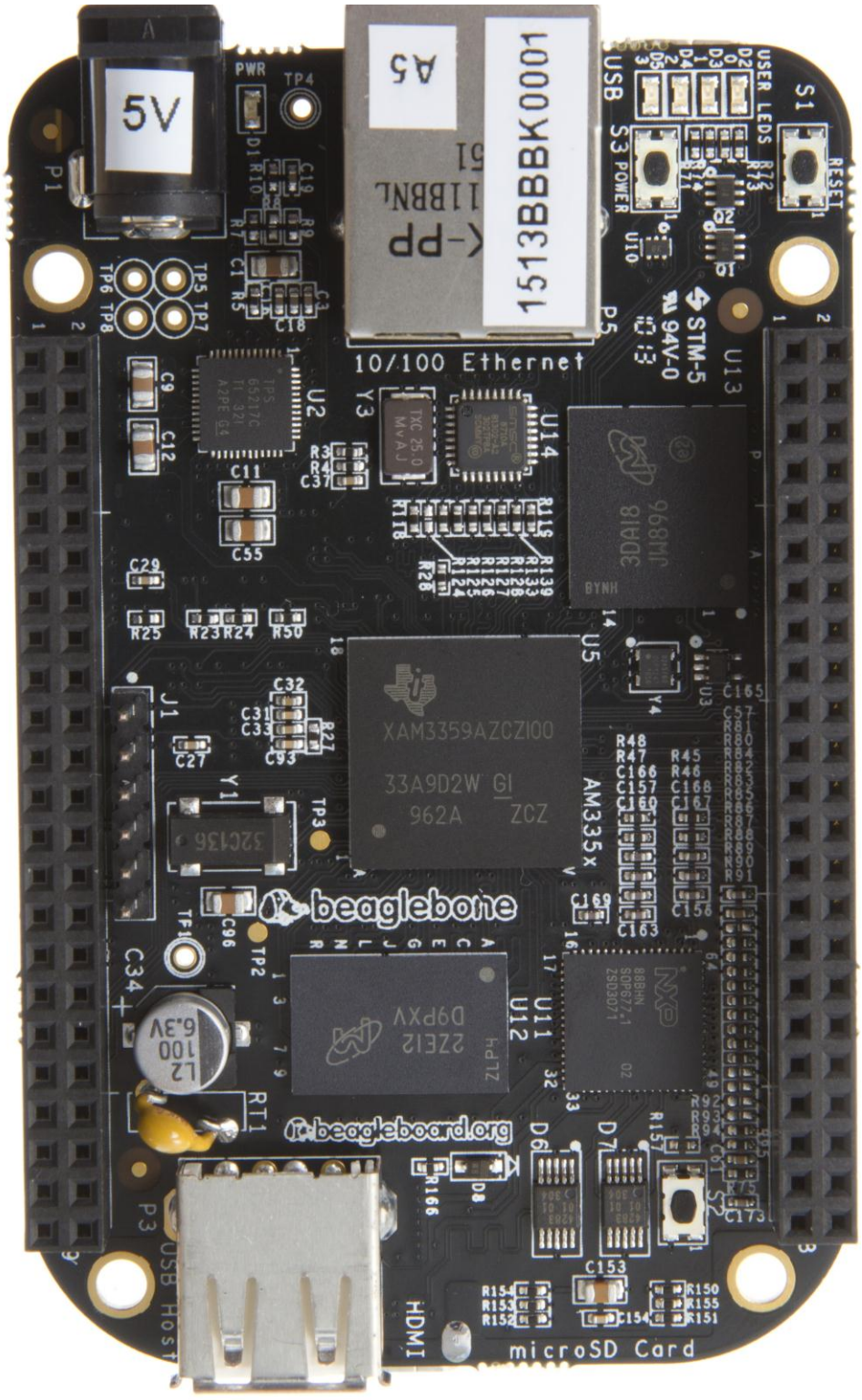


Figure 74. Top Side

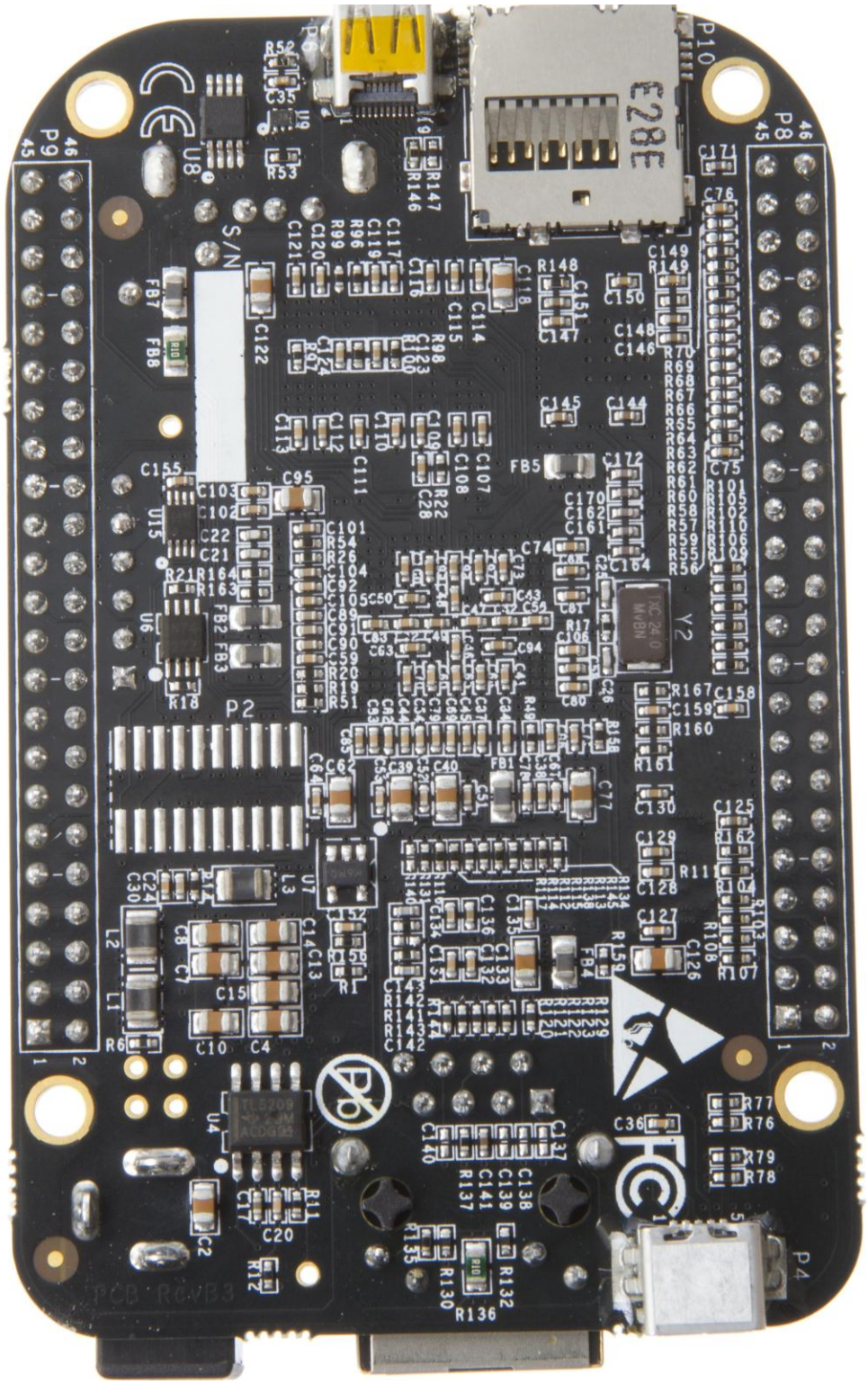


Figure 75. Bottom Side

3.4. BB View Cape – LCD 7’’

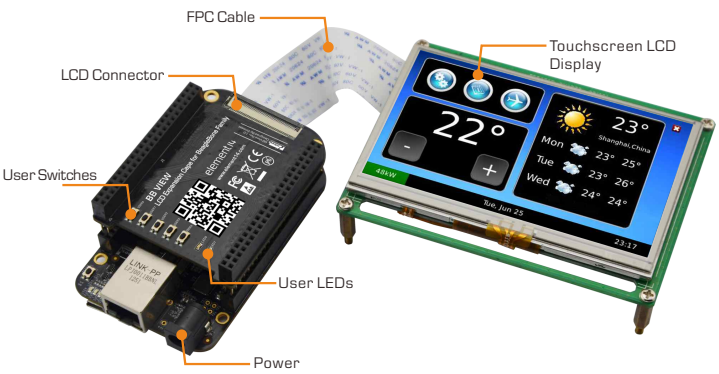
Exclusively From element14
A Premier Farnell Company

BB VIEW: LCD Expansion Cape for BeagleBone Family

Quick Start Guide

This Quick Start Guide introduces the BB VIEW from element14, an 24-bit LCD expansion cape for the BeagleBone board family with TFT LCD display.

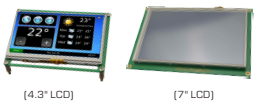
Kit Contents



A

BB VIEW Board

B



(4.3" LCD) (7" LCD)

4.3" or 7" LCD Display

C

FPC Cable

Setting Up the System*

Software Download	Download the latest image and the documents from: www.element14.com/BeagleBone
Connect the BB View	Connect the BB View to the BeagleBone or BeagleBone Black using 46 pin dual-row connectors (J1 and J2)
Connect the LCD	Connect the LCD module to the BB View using supplied FPC cable to the 50 pin LCD connector (keep the blue side of FPC cable UP).
Connect the Power Supply	Plug in the 5Vdc supply to power jack of BeagleBone or BeagleBone Black. (power supply not included in the package)
Image Update	Please refer to the User Manual (section 4) on how to update the BeagleBone or BeagleBone Black with a suitable image which is compatible with the BB View.
Reboot	Reboot the board

All related documents - User Manual, TISDK Image, Source Code, Schematics are available at:
www.element14.com/BeagleBone

Disclaimer

This product is intended to use for **ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY** and is not considered by element14 to be a finished end product fit for general consumer use. Persons handling the product(s) must have electronics training and observe good engineering practice standards. The goods being provided are not intended to be complete in terms of required design and/or manufacturing related protective considerations, including product safety and environmental measures typically found in end products that incorporate such semiconductor components or circuit boards.

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element14

BB-View Cape

Portable LCD Solution for the BeagleBone Family

BY

element14

User Manual

Version 1.2

Dated: 29th Mar 2014

1 Product Overview

1.1 Introduction

The BB-View is a portable LCD expansion cape with touchscreen capability for BeagleBone boards, a credit-card-sized expandable Linux computer to evaluate the TI's Sitara™ AM335x ARM® Cortex™-A8 processors.

The BB-View is 24-bit capable and supplied with an ~~24~~18-bit TFT LCD module, available in two size options: 4.3" & 7", which can display up to a resolution of 480x272 (4.3" LCD) and 800x480 (7" LCD). Both have a 4-wire resistive touchscreen interface.

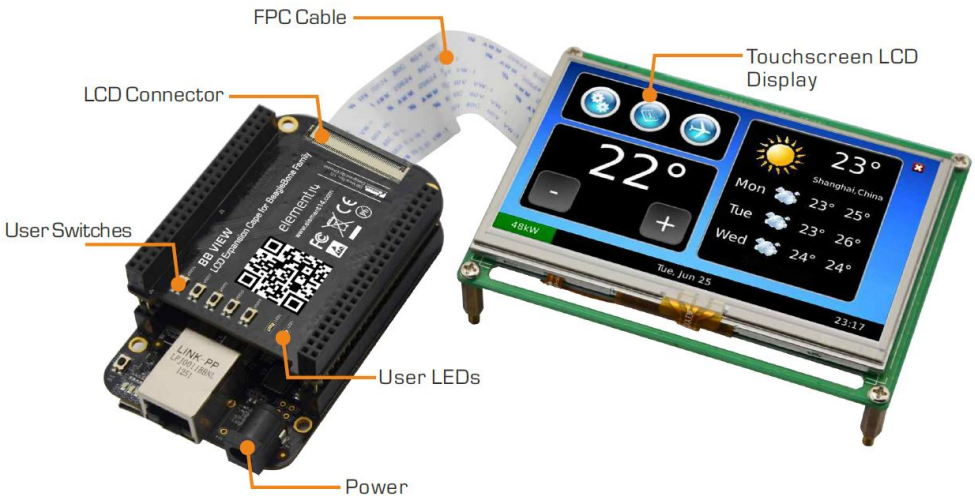
BB-View has been designed with convenience in mind and extends the I/O interfaces of the BeagleBone & BeagleBone Black allowing users to utilise a touchscreen LCD module without sacrificing I/O interface access. BB-View fits on top of the BeagleBone OR BeagleBone Black and still has full access to all the GPIOs via two 46-pin connectors. It's equipped with five switches (four for GPIOs & one for Boot) and two user defined LEDs.

The BB-View draws power directly from the board (BeagleBone or BeagleBone Black) eliminating the need for any kind of external power supply. The BB-View is also supplied with a pre-compiled image with Linux QT demos to help set up your BeagleBone & BeagleBone Black board quickly and easily.

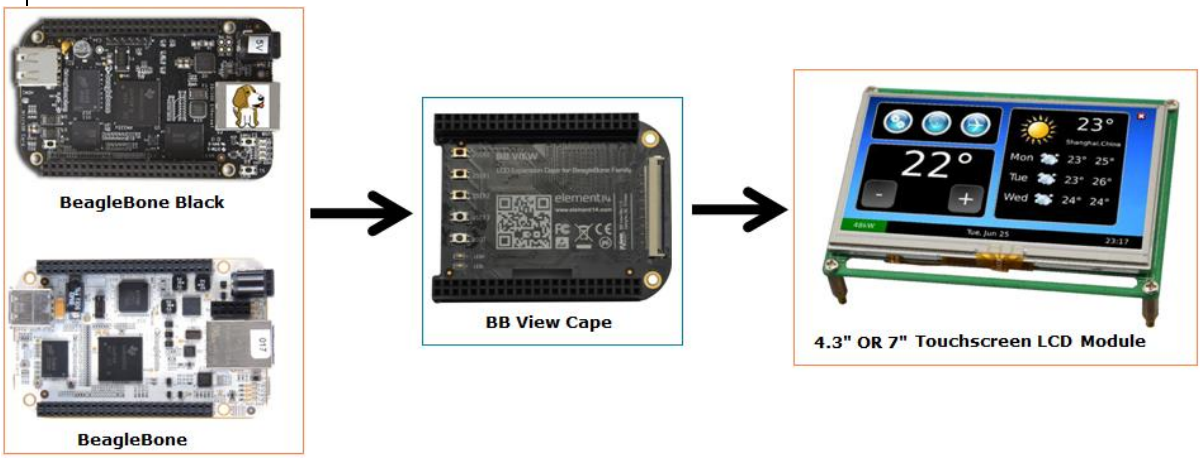
1.2 Kit Contents

- ✓ BB-View Cape Only [BeagleBone OR BeagleBone Black not included]
- ✓ 4.3” OR 7" Touchscreen LCD Module
- ✓ Flexible FPC Cable
- ✓ Quick Start Guide

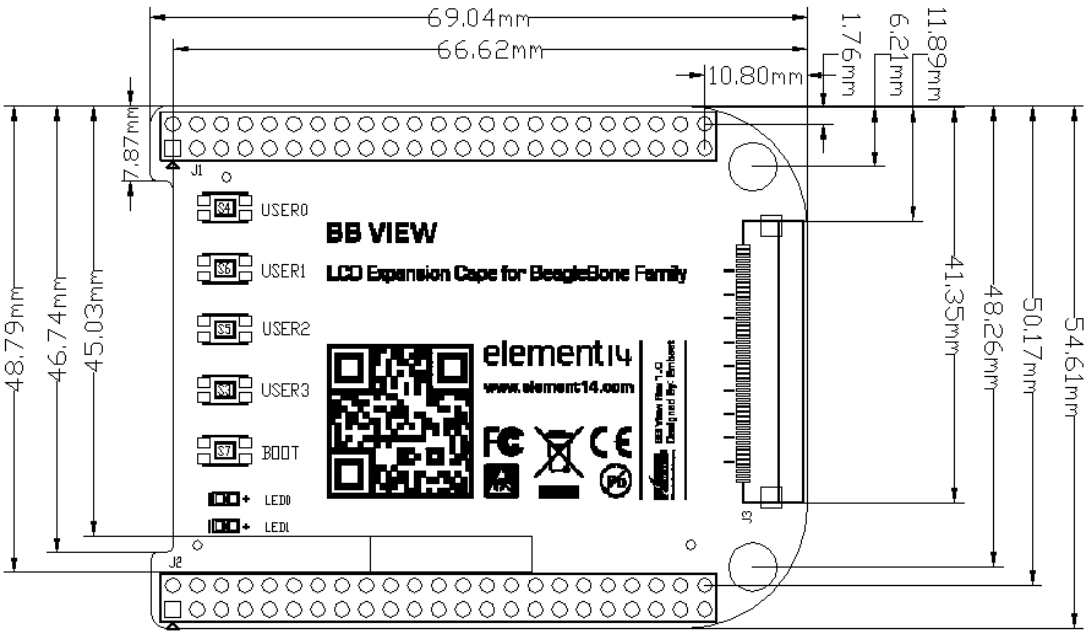
1.3 Board Interfaces



1.4 System Block Diagram



1.5 Physical Dimensions (mm)



2 BB-View Features

2.1 Hardware and Software Features:

- A 24-bit capable LCD expansion cape for the BeagleBone board family
- 4-wire, 18-bit resistive touchscreen LCD modules:
  - 4.3" LCD: 480x272 resolution
  - 7" LCD: 800x480 resolution
- Five switches (four for GPIOs & one for BOOT)
- Two user defined LEDs
- Full access to all the GPIOs via two 46-pin connectors (besides those already used by the BB-View)
- Powered directly from BeagleBone boards, no external power supply required.
- Provided with pre-compiled BSP image with QT Demo to help setup the BeagleBone board quickly and easily.
- Works with BeagleBone & BeagleBone Black
- Supporting TISDK and Angstrom image
- Drivers and driver source code are provided along with BB-View

2.2 Operational Parameters:

- Dimensions: 69.04mm x 54.61mm
- Operating Humidity: 20% ~ 90%
- Power Supply: +5V (provided by BeagleBone board)
- PCB Layers: 4

3 Hardware Description

BB-View expansion cape has an LCD connector (LCD) and two 46-position dual-row connectors (J1 and J2) that can be used as extended I/O interfaces for the BeagleBone & BeagleBone Black. This chapter contains pin definitions for these connectors.

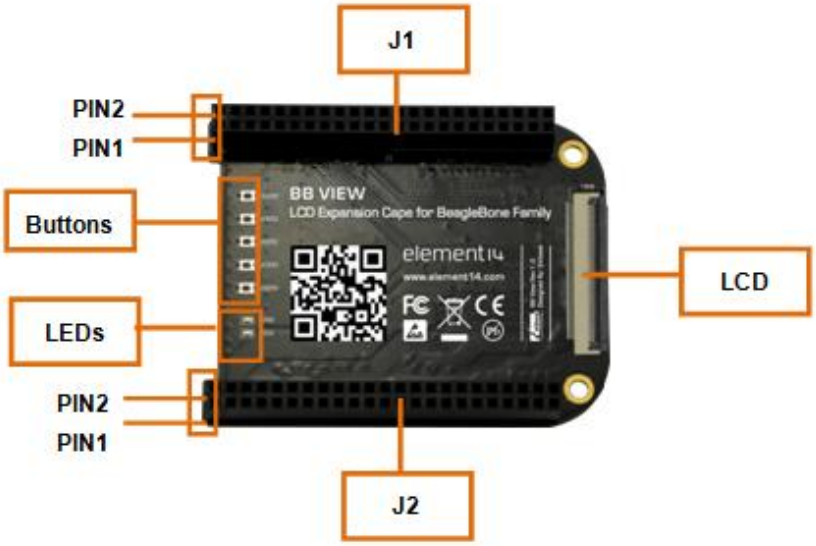


Figure 1: *Pin Locations on the BB-View*

3.1 LCD Interface (LCD)

Pins	Definitions	Descriptions
1	B0	LCD Pixel data bit 23
2	B1	LCD Pixel data bit 20
3	B2	LCD Pixel data bit 17
4	B3	LCD Pixel data bit 11
5	B4	LCD Pixel data bit 12
6	B5	LCD Pixel data bit 13
7	B6	LCD Pixel data bit 14
8	B7	LCD Pixel data bit 15
9	GND	GND

Pins	Definitions	Descriptions
10	G0	LCD Pixel data bit 22
11	G1	LCD Pixel data bit 19
12	G2	LCD Pixel data bit 5
13	G3	LCD Pixel data bit 6
14	G4	LCD Pixel data bit 7
15	G5	LCD Pixel data bit 8
16	G6	LCD Pixel data bit 9
17	G7	LCD Pixel data bit 10
18	GND	GND
19	R0	LCD Pixel data bit 21
20	R1	LCD Pixel data bit 18
21	R2	LCD Pixel data bit 16
22	R3	LCD Pixel data bit 0
23	R4	LCD Pixel data bit 1
24	R5	LCD Pixel data bit 2
25	R6	LCD Pixel data bit 3
26	R7	LCD Pixel data bit 4
27	GND	GND
28	DEN	AC bias control (STN) or pixel data enable (TFT)
29	HSYNC	LCD Horizontal Synchronization
30	VSYNC	LCD Vertical Synchronization
31	GND	GND
32	CLK	LCD Pixel Clock
33	GND	GND
34	X+	X+ Position Input
35	X-	X- Position Input
36	Y+	Y+ Position Input
37	Y-	Y- Position Input
38	SPI_CLK	SPI clock
39	SPI_MOSI	Slave data in, master data out

Pins	Definitions	Descriptions
40	SPI_MISO	Slave data out, master data in
41	SPI_CS	SPI enable
42	IIC_CLK	IIC master serial clock
43	IIC_DAT	IIC serial bidirectional data
44	GND	GND
45	VDD1	3.3V power for LCD buffer
46	VDD2	3.3V
47	VDD3	5V
48	VDD4	5V
49	RESET	No connection
50	PWREN	GPIO

3.2 Extended I/O Interface (J1)

Pins	Definitions	Descriptions
1	GND	GND
2	GND	GND
3	NC	NC
4	NC	NC
5	NC	NC
6	NC	NC
7	NC	NC
8	NC	NC
9	NC	NC
10	NC	NC
11	LCD_DATA18	LCD Pixel data bit 18
12	LCD_DATA19	LCD Pixel data bit 19
13	LCD_DATA22	LCD Pixel data bit 22
14	LCD_DATA21	LCD Pixel data bit 21
15	LCD_DATA16	LCD Pixel data bit 16

Pins	Definitions	Descriptions
16	LCD_DATA17	LCD Pixel data bit 17
17	LCD_DATA20	LCD Pixel data bit 20
18	NC	NC
19	LCD_DATA23	LCD Pixel data bit 23
20	NC	NC
21	NC	NC
22	NC	NC
23	NC	NC
24	NC	NC
25	NC	NC
26	NC	NC
27	LCD_VSYNC	LCD Vertical Synchronization
28	LCD_PCLK	LCD Pixel Clock
29	LCD_HSYNC	LCD Horizontal Synchronization
30	LCD_DE	AC bias control (STN) or pixel data enable (TFT)
31	LCD_DATA14	LCD Pixel data bit 14
32	LCD_DATA15	LCD Pixel data bit 15
33	LCD_DATA13	LCD Pixel data bit13
34	LCD_DATA11	LCD Pixel data bit 11
35	LCD_DATA12	LCD Pixel data bit 12
36	LCD_DATA10	LCD Pixel data bit 10
37	LCD_DATA8	LCD Pixel data bit 8
38	LCD_DATA9	LCD Pixel data bit 9
39	LCD_DATA6	LCD Pixel data bit 6
40	LCD_DATA7	LCD Pixel data bit 7
41	LCD_DATA4	LCD Pixel data bit 4
42	LCD_DATA5	LCD Pixel data bit 5
43	LCD_DATA2	LCD Pixel data bit 2
44	LCD_DATA3	LCD Pixel data bit 3
45	LCD_DATA0	LCD Pixel data bit 0

Pins	Definitions	Descriptions
46	LCD_DATA1	LCD Pixel data bit 1

3.3 Extended I/O Interface (J2)

Pins	Definitions	Descriptions
1	GND	GND
2	GND	GND
3	VDD_3V3B	3.3V
4	VDD_3V3B	3.3V
5	VDD5V	5V
6	VDD5V	5V
7	SYS5V	5V
8	SYS5V	5V
9	NC	NC
10	SYS_RESETn	Reset
11	USER3	GPIO
12	LED0	GPIO
13	NC	NC
14	PWM	Power on enable
15	NC	NC
16	USER0	GPIO
17	I2C1_SCL	IIC3 master serial clock
18	I2C1_SDA	IIC serial bidirectional data
19	NC	NC
20	LED1	GPIO
21	NC	NC
22	NC	NC
23	USER2	GPIO
24	USER1	GPIO
25	NC	NC

Pins	Definitions	Descriptions
26	NC	NC
27	NC	NC
28	SPI1_CS0	SPI enable 0
29	SPI1_DO	SPI data 0
30	SPI1_D1	SPI data 1
31	SPI1_SCLK	SPI Clock
32	VDD_ADC	ADC power
33	NC	NC
34	NC	NC
35	NC	NC
36	NC	NC
37	Y+	Y+ Position Input
38	Y-	Y- Position Input
39	X+	X+ Position Input
40	X-	X- Position Input
41	NC	NC
42	NC	NC
43	GND	GND
44	GND	GND
45	GND	GND
46	GND	GND

3.4 Keypad Interfaces

Pins	Definitions	Descriptions
1	USER0	User defined
2	USER1	User defined
3	USER2	User defined
4	USER3	User defined
5	BOOT	Boot switch

3.5 LED Interfaces

Pins	Definitions	Descriptions
1	USER0	User defined
2	USER1	User defined

3.5. Módulo Bluetooth

Bluetooth 4.0 USB Micro Adapter

GBU521

- Wirelessly communicates with Bluetooth-enabled computers, printers, PDAs, cell phones, headsets, and more
- Allows any computer with a USB port to become a Bluetooth enabled computer
- Ultra-low power consumption
- Supports dual-mode and Bluetooth Low Energy
- Supports maximum asynchronous transfer rate of 3Mbps
- Wideband audio support: provides clear perception of voice when using a Bluetooth headset, and enhances the functionality of echo cancellation and noise reduction
- 2.4GHz ~ 2.4835GHz ISM Band
- Ultra portable - tiny enough to stay with your laptop
- Supports A2DP stereo audio wireless streaming
- Up to 30ft (10m) maximum wireless range
- Built-in security to assure the privacy of your communication-pairing, encryption, and authentication
- Supports the following services: Generic Access (GAP), Serial Port (SPP), Dial-Up Networking (DUN), Bluetooth Proximity Profile, LAN Access (LAP), Object Push (OPP), File Transfer (FTP), Headset (HSP), Advanced Audio Distribution (A2DP), Audio/Video Remote Control (AVRCP), Synchronization (SYNCH)
- Backwards compatible with Bluetooth 1.1, 1.2, 2.0 and 3.0

Bluetooth Adapter

The IOGEAR Bluetooth 4.0 USB Micro Adapter offers Bluetooth connectivity at a fraction of the size of normal Bluetooth USB adapters. About the size of an adult fingernail, the IOGEAR Bluetooth 4.0 USB Micro Adapter allows users to connect to all the latest Bluetooth devices like cell phones, PDAs, mice, keyboards and more. Because the IOGEAR Bluetooth 4.0 Micro Adapter is so small you can easily plug it into your computer without blocking any surrounding USB ports.

The IOGEAR Bluetooth 4.0 Micro Adapter allows users to connect up to three Bluetooth devices together and transfer even the largest files quickly and easily. With the Micro Adapter's lower power consumption; you can enjoy longer battery life on your notebook computer and other devices. This Bluetooth Class 2 adapter is compatible with PC computers, and offers a wireless range of 30 feet (10 meter). It is great for a wide range of applications and smaller form factor devices in the healthcare, fitness, security and home entertainment industries.

Bluetooth 4.0 USB Micro Adapter

How does it work?

Computer
Plug Bluetooth 4.0 USB Micro Adapter into computer and exchange images, music, files and other data between your Bluetooth device and computer

Bluetooth Devices
Bluetooth devices may include: mobile phone, headset, computer, keyboard, mouse, PDA, printer, and more

Product Requirements

Hardware Requirement:

- Available USB port

Operating System:

- For PCs: Windows XP, Windows Vista, and Windows 7

Package Contents

- 1 Bluetooth to USB adapter
- 1 Driver/Manual CD*
- 1 Quick Start Guide
- 1 Warranty / Registration Card

**Warning: ***The included CD is a mini size disket, and it is recommended not to insert the mini size CD into the slot-loading CD ROM drive to avoid damaging the slot-loading CD ROM drive.

*For Windows XP driver, please go to www.iogear.com/support download the latest Windows XP driver.

Specifications

Function	GBU521
Operating Temperature	0 C - 50 C
Humidity	5% - 90% non-condensing
Transmission Power	4 dBm(Class 2)
Frequency Band	2.402 GHz - 2.4835 GHz Unlicensed ISM band
Modulation	GFSK for 1Mbps, Π / 4-DQPSK for 2Mbps; 8-DPSK for 3Mbps
Data Rate	Up to 3 Mbps
Interface	USB
Sensitivity	<-82dBm at < 0.1% BER
Security	128b AES and application layer user defined
Profiles Supported	Generic Access (GAP), Serial Port (SPP), Dial-Up Networking (DUN), Fax (FAX), LAN Access (LAP), Object Push (OPP), File Transfer (FTP), Headset (HSP), Advanced Audio Distribution (A2DP), Audio/Video Remote Control (AVRCP), Synchronization (SYNCH)
Range	30 ft (10m)

Dimensions	GBU521
POP Information	
10" Peg Hook	14
6" Peg Hook	8
Click Strip	6
Unit Dimensions	
Width	0.69 in. [1.75 cm]
Height	0.38 in. [0.95 cm]
Depth	0.75 in. [1.91 cm]
Unit Package Dimensions	
Width	4.63 in. [11.75 cm]
Height	6.63 in. [16.83 cm]
Depth	0.56 in. [1.43 cm]
Master Carton	
Width	6.0 in. [15.2 cm]
Height	7.63 in. [19.4 cm]
Depth	5.0 in. [12.7 cm]
Master Carton Qty.	6
Weight	
Master Carton Wt.	1.15 lbs. [0.52 kg]
Unit Pack Wt.	0.15 lbs [0.07 kg]
Unit Wt.	0.2 Oz

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3.6. Batería

Specification of

Li-ion Polymer Battery 3.7V 10000 mAh

PL-9059156

AA Portable Power Corp

http://www.batteryspace.com
2700 Rydin Road unitC. Richmond, CA, 94804 USA.
Tel: 510-525-2328
Fax: 510-5254728

Polymer Lithium-ion battery Product Specification	Doc. No.	Q/WMDCJ06005-2004
	Edition No.	2.0
	Sheet	1/6

1、 Scope

This product specification describes polymer lithium-ion battery. Please using the test methods that recommend in this specification. If you have any opinions or advices about the test items and methods, please contact us. Please read the cautions recommended in the specifications first, take the credibility measure of the cell's using.

If the cells should be using at the environment that not preferred in this document, please connect with our first and get our authorization.

It is claimed that we should have no any responsibility with the contingency and loss due to the cells' wrong usage (not preferred in the product specification).

2、 Product Type, Model and Dimension

2.1 Type：Polymer lithium-ion battery

2.2 Model：9059156(Cell or adding Ni tabs)

2.3 Cell Dimension with Torelence +/- 0.5 mm (Thickness×Width×Length，mm^3): 9.2×59.0×157.0

Pack Dimension(Max, Thickness×Width×Length，mm^3): /

3、 Specification

Item		Specifications	Remark
Nominal Capacity		11500 mAh	0.2C_5A discharge
Typial Capacity		10000 mAh	0.2C_5A discharge
Nominal Voltage		3.7V	Average Voltage at 0.2C_5A discharge
Charge Current		Standard：0.2 C_5A；Max：1C_5A	Working temperature：0～40℃
Charge cut-off Voltage		4.20±0.03V	
Standard Discharge Current		0.2C_5A	Working temperature：-20～60℃
Max Discharge Current		2.0C_5A	Working temperature：0～60℃
Discharge cut-off Voltage		2.75 V	
Cell Voltage		3.7-3.9 V	When leave factory
Impedance		≤15mΩ	AC 1KHz after 50% charge
Weight		Approx: 196g	
Storage temperature	≤1month	-20～45℃	Best 20±5℃ for long-time storage
	≤3month	0～30℃	
	≤6month	20±5℃	
Storage humidity		65±20% RH	

4、 General Performance

Definition of Standard charging method：At 20±5℃，charging the cell initially with constant current 0.2C_5A till voltage 4.2V, then with constant voltage 4.2V till current declines to 0.05C_5A.

Item		Test Methods	Performance
4.1	0.2C Capacity	After standard charging, laying the battery 0.5h, then discharging at 0.2C_5A to voltage 2.75V, recording the discharging time.	≥300min
4.2	1C Capacity	After standard charging, laying the battery 0.5h, then discharging at 1C_5A to voltage 2.75V, recording the discharging time.	≥54min
4.3	Cycle Life	Constant current 1C_5A charge to 4.2V, then constant voltage charge to current declines to 0.05C_5A, stay 5min，constant current 1C_5A discharge to 2.75V，stay 5min. Repeat above steps till continuously discharging time less than 36min.	≥300times
4.4	Capability of keeping electricity	20±5℃, After standard charging, laying the battery 28days, discharging at 0.2C_5A to voltage 2.75V, recording the discharging time.	≥240min

5、 Environment Performance

Item		Test Methods	Performance
5.1	High temperature	After standard charging, laying the battery 4h at 60℃, then discharging at 0.2C_5A to voltage 2.75V, recording the discharging time.	⩾270min
5.2	Low temperature	After standard charging, laying the battery 4h at -20℃, then discharging at 0.2C_5A to voltage 2.75V, recording the discharging time.	⩾210min
5.3	Constant humidity and temperature	After standard charging, laying the battery 48h at 40±2℃, RH 93±2%. Recording 0.2C_5A discharging time	No distortion No electrolytes leakage ⩾270 min
5.4	Temperature shock	After standard charging, battery stored at -20℃ for 2 hours, then stored at 50℃ for 2 hours. Repeat 10 times.	No electrolytes leakage

6、 Mechanical Performance

Item		Test Methods	Performance
6.1	Vibration	After standard charging, put battery on the vibration table. 30 min experiment from X,Y,Z axis. Scan rate: 1 oct/min; Frequency 10-30Hz, Swing 0.38mm; Frequency 30-55Hz, Swing 0.19mm.	No influence to batteries' electrical performance and appearance.
6.2	Collision	After vibration test, batteries were laying on the vibration table about X, Y, Z axis. Max frequency acceleration: 100m/s^2; collision times per minutes: 40~80; frequency keeping time 16ms; all collision times 1000±10.	No influence to batteries' electrical performance and appearance.
6.3	Drop	Random drop the battery from 10m height onto concrete one times.	No explosion or fire

7、 Safety Test

Test conditions： The following tests must be measured at flowing air and safety protection conditions. All batteries must standard charge and lay 24h.

Item		Test Methods	Performance
7.1	Over charge	At 20±5℃, charging batteries with constant current 3C_5A to voltage5V, then with constant voltage5V till current decline to 0. Stop test till batteries' temperature 10℃ lower than max temperature.	No explosion or fire
7.2	Over discharge	At 20 ± 5 ℃, discharge battery with 0.2C_5A continuously 12.5h.	No explosion or fire
7.3	Short-circuit	At 20±5℃, connect batteries' anode and cathode by wire which impedance less than 50mΩ, keep 6h.	No explosion or fire
7.4	Extrusion	At 20±5℃, put the battery in two parallel steal broad, add pressure 13kN.	No explosion or fire
7.5	Thermal shock	Put the battery in the oven. The temperature of the oven is to be raised at 5±1℃ per minute to a temperature of 130±2℃ and remains 60 minutes.	No explosion or fire

8、Cautions

1. Cautions of batteries' operation

The batteries must be careful of proceed the operation for it's soft package.

1. Aluminum packing materials

The aluminum packing material was easily damaged by the sharp edge part, such as nickel-tabs.

(1) forbid to use the sharp part touching the battery;

(2) should cleaning working condition, avoiding the sharp edge part existence;

(3) forbid to pierce the battery with nail and other sharp items;

(4) the battery was forbidden with metal, such as necklace, hairpin etc in transportation and storage.

2. Sealed edge

Sealing edge is very easily damaged and don't bend it.

The Al interlayer of package has good electric performance. It's forbidden to connect with exterior component for preventing short-circuits.

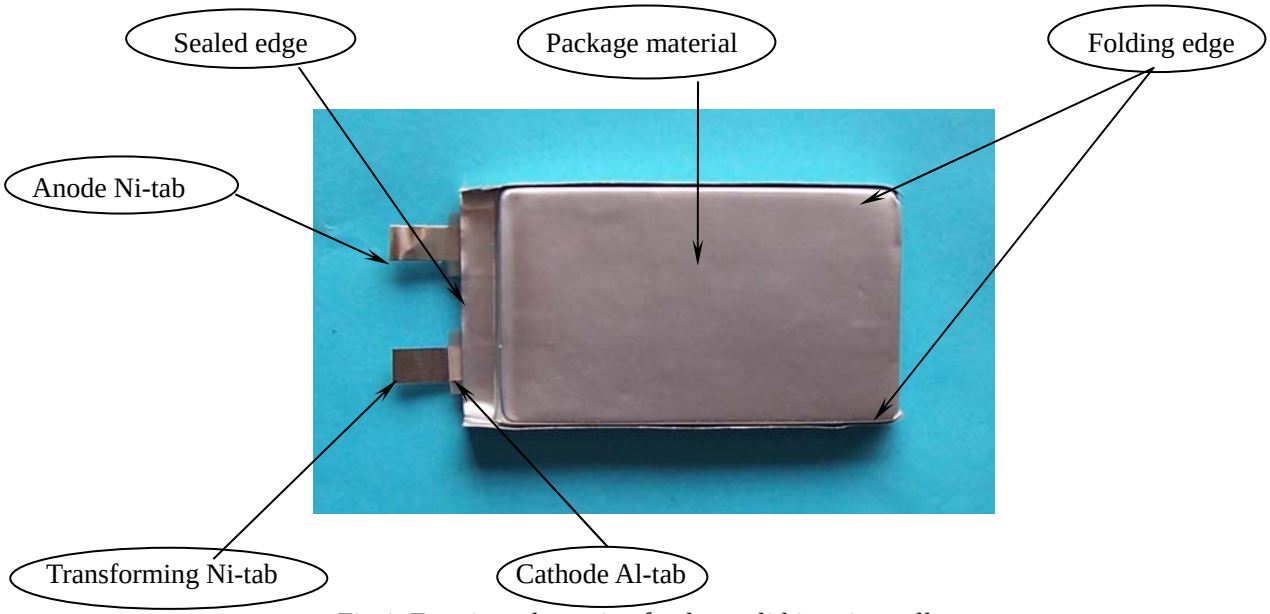


Fig.1. Exterior schematic of polymer lithium-ion cells

3. Folding edge

The folding edge is formed in batteries' processes and passed all hermetic tests, don't open or deform it. The Al interlayer of package has good electric performance. It's forbidden to connect with exterior component for preventing short-circuits.

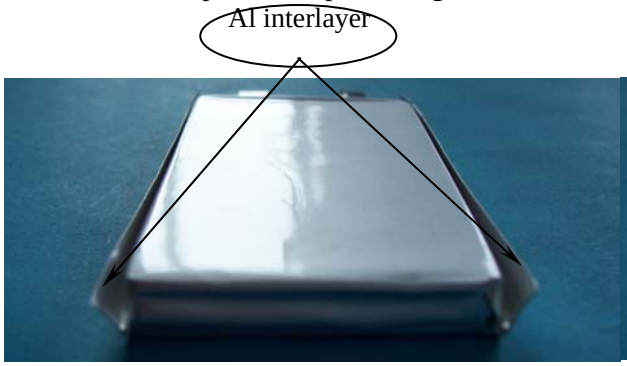


Fig.2. Single folding edge schematic of PL cells

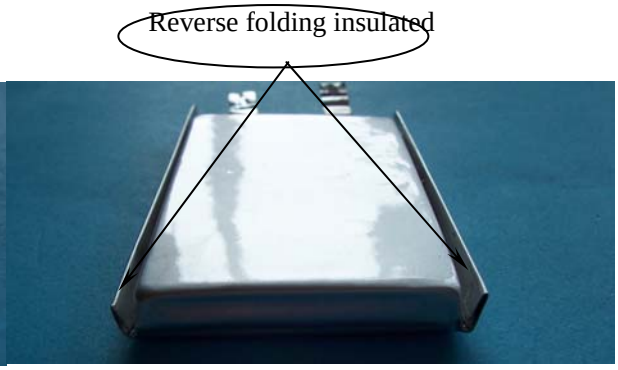


Fig.3. Reverse folding edge schematic of PL cells

4.Tabs

The batteries' tabs are not so stubborn especially for aluminum tabs. Don't bend tabs.

5.Mechanical shock

Don't fall, hit, bent the batteries' body.

6.Short-circuit

Short-circuit is strictly prohibited. It should damage batteries badly.

2. Standard Test Environment for polymer lithium-ion batteries

Environment temperature: 20±5℃

Humidity: 45-85%

3. Cautions of charge & discharge

1. charge

Charging current should be lower than values that recommend below. Higher current and voltage charging may cause damage to cell electrical, mechanical, safety performance and could lead heat generation or leakage.

⑴ Batteries charger should charging with constant current and constant voltage mode;

⑵ Charging current should be lower than (or equal to)1C_5A;

⑶ Temperature 0～40℃ is preferred when charging;

⑷ Charging voltage must be lower than 4.25V.

2. discharge

⑴ Discharging current must be lower than (or equal to)2C_5A;

⑵ Temperature 0～60℃ is preferred when discharging;

⑶ Discharging voltage must not be lower than 2.75V.

3. over-discharge

It should be noted that the cell would be at an over-discharge state by its self-discharge. In order to prevent over-discharge, the cell shall be charged periodically to keeping voltage between 3.6-3.9V. Over-discharge may cause loss of cell performance. It should be noted that the cell would not discharge till voltage lower than 2.5V.

4.Storage of polymer lithium-ion batteries

The environment of long-time storage:

Temperature: 20±5℃;

Humidity: 45-85%;

Batteries were 40～60% charged.

5.Transportation of polymer lithium-ion batteries

The batteries should transportation with 10～50% charged states.

6.Others

Please note cautions below to prevent cells' leakage, heat generation and explosion.

Prohibition of disassembly cells;

Prohibition of cells immersion into liquid such as water or seawater;

Prohibition of dumping cells into fire;

Prohibition of using damaged cells. The cells with a smell of electrolyte or leakage must be placed away from fire to avoid firing.

In case of electrolyte leakage contact with skin, eye, physicians shall flush the electrolyte immediately with fresh water and medical advise is to be sought.

9. Notice of Designing Battery Pack

9.1 Pack design

Battery pack should have sufficient strength and battery should be protected from mechanical shock. No sharp edge components should be inside the pack contain the battery.

9.2 PCM design

The overcharge threshold voltage should not be exceed 4.25V.

The over-discharge threshold voltage should not be lower than 2.3V.

The PCM should have short protection function built inside.

9.3 Tab connection

Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts.

If apply manual solder method to connect tab with PCM, the notice below is very important to ensure battery performance.

⑴ The electric iron should be temperature controlled and ESD safe;

⑵ Soldering temperature should not exceed 350℃;

⑶ Soldering time should not be longer than 3s, keep battery tab cold down before next soldering;

⑷ Soldering times should not exceed 5 times;

⑸ Directly heat cell body is strictly prohibited, battery may be damaged by heat above approx. 100℃.

9.4 Cell fixing

The battery should be fixed to the battery pack by its large surface area. No cell movement in the battery pack should be allowed.

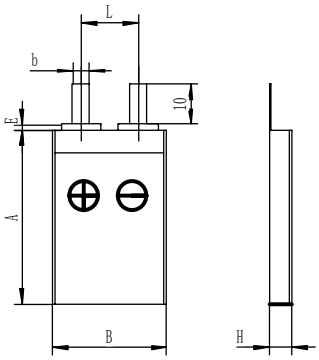
9.5 Cells replacement

The cell replacement should be done by professional people.

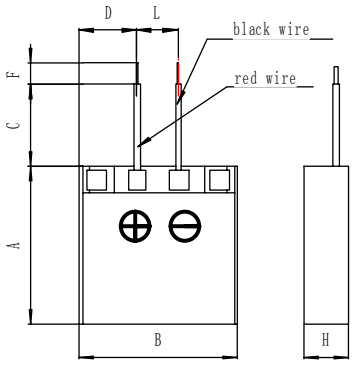
Prohibit short-circuit between cells' Al package and exterior component.

Fig.4. Schematic of wrong assembly

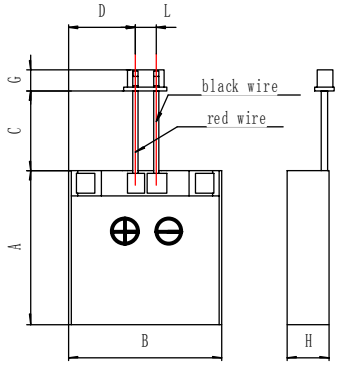
10. Schematic of Battery with tolerance +/- 0.5 mm:



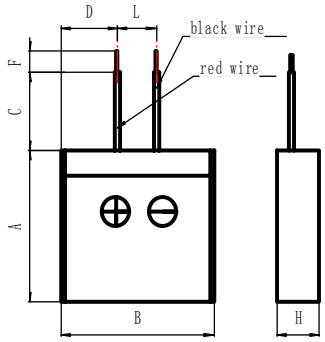
√ Cell or adding Ni tabs



☐Cell adding PCB, wire



☐Cell adding PCB, wire, plugs



☐ Cell adding wire

All **Parameter with tolerance +/- 0.5 mm:**

Sign	Item	（mm）	Remak	Sign	Item	（mm）	Remark
A	Length	157.0		L	Space between Tabs	24	
B	Width	59.0		E	PP membrane Length	2	
H	Thickness	9.2		b	Tab Width	5	
	Wire Standard	/			Plug Standard	/	

3.7. BMS

Protection Circuit Module Specifications For 7.4V Li-ion/Li-Po Battery Pack

- Model：PCB-S2A7B
- Features:

Apply for 2 Cells Li-ion / Li-polymer Battery Pack with discharging current < 3A

Adopt seiko S-8232 protection IC

Dimension：L33*W14.7mm

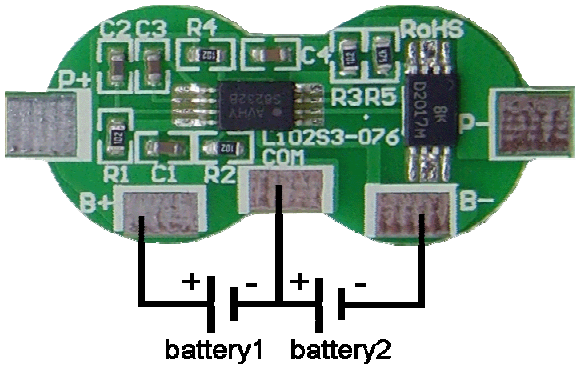
Weight：0.8 grams

Electric performance：

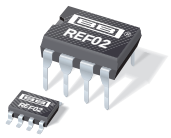
* Over-charge protection voltage for single cell：4.350 ± 0.025V
* Over-discharge protection voltage for single cell：2.30 ± 0.080V
* Over-current protection： 7.5～9.5A
* Maximal continuous discharging current：3A
* Maximal current consumption： 20uA
* Short circuit protection：Automatic Recovery
* Protection circuitry resistance: ≤50mΩ

Terminal explanations：

P+,P- = Charge+/-,Discharge+/-



3.8. REF-02 5V Precision Voltage



SBVS003B – JANUARY 1993 – REVISED JANUARY 2005

+5V Precision VOLTAGE REFERENCE

FEATURES

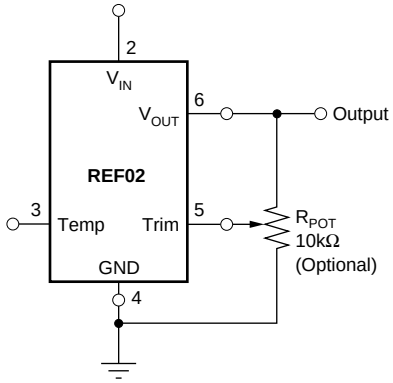
- **OUTPUT VOLTAGE: +5V ±0.2% max**
- **EXCELLENT TEMPERATURE STABILITY: 10ppm/°C max (–40°C to +85°C)**
- **LOW NOISE: 10μV_{PP} max (0.1Hz to 10Hz)**
- **EXCELLENT LINE REGULATION: 0.01%/V max**
- **EXCELLENT LOAD REGULATION: 0.008%/mA max**
- **LOW SUPPLY CURRENT: 1.4mA max**
- **SHORT-CIRCUIT PROTECTED**
- **WIDE SUPPLY RANGE: 8V to 40V**
- **INDUSTRIAL TEMPERATURE RANGE: –40°C to +85°C**
- **PACKAGE OPTIONS: DIP-8, SO-8**

APPLICATIONS

- **PRECISION REGULATORS**
- **CONSTANT CURRENT SOURCE/SINK**
- **DIGITAL VOLTMETERS**
- **V/F CONVERTERS**
- **A/D AND D/A CONVERTERS**
- **PRECISION CALIBRATION STANDARD**
- **TEST EQUIPMENT**

DESCRIPTION

The REF02 is a precision 5V voltage reference. The drift is laser trimmed to 10ppm/°C max over the extended industrial and military temperature range. The REF02 provides a stable 5V output that can be externally adjusted over a ±6% range with minimal effect on temperature stability. The REF02 operates from a single supply with an input range of 8V to 40V with a very low current drain of 1mA, and excellent temperature stability due to an improved design. Excellent line and load regulation, low noise, low power, and low cost make the REF02 the best choice whenever a 5V voltage reference is required. Available package options are DIP-8 and SO-8. The REF02 is an ideal choice for portable instrumentation, temperature transducers, Analog-to-Digital (A/D) and Digital-to-Analog (D/A) converters, and digital voltmeters.



+5V Reference with Trimmed Output

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

All trademarks are the property of their respective owners.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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SPECIFICATIONS

ELECTRICAL

At T_A = +25°C and V_{IN} = +15V power supply, unless otherwise noted.

PARAMETER	CONDITIONS	REF02A			REF02B			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE Change with Temperature[1, 2] (ΔV_{OT}) –40°C to +85°C	I_{LOAD} = 0mA	4.985	5.0 0.05	5.015 0.19	4.990	* 0.05	5.010 0.13	V %
OUTPUT VOLTAGE DRIFT[3] –40°C to +85°C (TCV_O)			4	15		4	10	±ppm/°C
LONG-TERM STABILITY First 1000h Second 1000h	2000h Test		 100 50			 100 50		 ±ppm ±ppm
OUTPUT ADJUSTMENT RANGE	R_{POT} = 10kΩ[6]	±3	±6		*	*		%
CHANGE IN V_O TEMP COEFFICIENT WITH OUTPUT ADJUSTMENT (–55°C to +125°C)	R_{POT} = 10kΩ		0.7			*		ppm/%
OUTPUT VOLTAGE NOISE	0.1Hz to 10Hz[5]		4	10		*	*	μV_{PP}
LINE REGULATION[4] –40°C to +85°C	V_{IN} = 8V to 33V V_{IN} = 8.5V to 33V		0.006 0.008	0.010 0.012		* *	* *	%/V
LOAD REGULATION[4] –40°C to +85°C	I_L = 0mA to +10mA I_L = 0mA to +10mA		0.005 0.007	0.010 0.012		* *	0.008 0.010	%/mA
TURN-ON SETTLING TIME	To ±0.1% of Final Value		5			*		µs
QUIESCENT CURRENT	No Load		1.0	1.4		*	*	mA
LOAD CURRENT (SOURCE)		10	21		*	*		mA
LOAD CURRENT (SINK)		–0.3	–0.5		*	*		mA
SHORT-CIRCUIT CURRENT	V_{OUT} = 0		30			*		mA
POWER DISSIPATION	No Load		15	21		*	*	mW
TEMPERATURE VOLTAGE OUTPUT[7]			630			*		mV
TEMPERATURE COEFFICIENT of Temperature Pin Voltage –55°C to +125°C			 2.1					 mV/°C
TEMPERATURE RANGE Specification REF02A, B, C		 –40		 +85	 *		 *	 °C

NOTES: (1) ΔV_{OT} is defined as the absolute difference between the maximum output and the minimum output voltage over the specified temperature range expressed as a percentage of 5V:

$$\Delta V_O = \left| \frac{V_{MAX} - V_{MIN}}{5V} \right| \times 100$$

(2) ΔV_{OT} specification applies trimmed to +5.000V or untrimmed.

(3) TCV_O is defined as ΔV_{OT} divided by the temperature range.

(4) Line and load regulation specifications include the effect of self heating.

(5) Sample tested.

(6) 10kΩ potentiometer connected between V_{OUT} and ground with wiper connected to Trim pin. See figure on page 1.

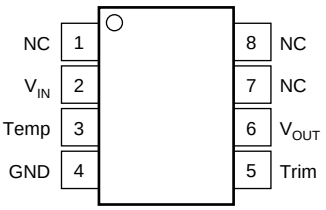
(7) Pin 3 is insensitive to capacitive loading. The temperature voltage will be modified by 7mV for each µA of loading.

ABSOLUTE MAXIMUM RATINGS

Input Voltage	+40V
Operating Temperature	
P, U	–40°C to +85°C
Storage Temperature Range	
P, U	–65°C to +125°
Output Short Circuit Duration (to Ground or V_{IN})	Indefinite
Junction Temperature	–65°C to +150°
θ_{JA} P	120°C/W
U	80°C/W
Lead Temperature (soldering, 60s)	+300°C

PIN CONFIGURATIONS

Top View **DIP/SO**



ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

PACKAGE/ORDERING INFORMATION(1)

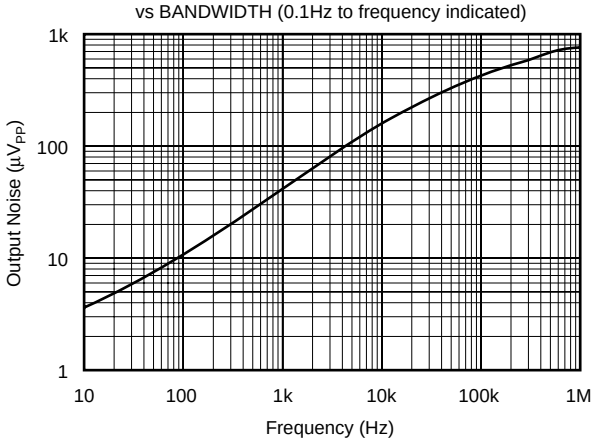
PRODUCT	V_{OUT} at 25°C	MAX DRIFT (ppm/°C)	PACKAGE	PACKAGE DRAWING DESIGNATOR	SPECIFICATION TEMPERATURE RANGE
REF02AU	5V±15mV	±15	SO-8	D	–40°C to +85°C
REF02BU	5V±10mV	±10	SO-8	D	–40°C to +85°C
REF02AP	5V±15mV	±15	DIP-8	P	–40°C to +85°C
REF02BP	5V±10mV	±10	DIP-8	P	–40°C to +85°C

NOTE: (1) For the most current package and ordering information, see the Package Option Addendum located at the end of this data sheet, or see the TI website at www.ti.com.

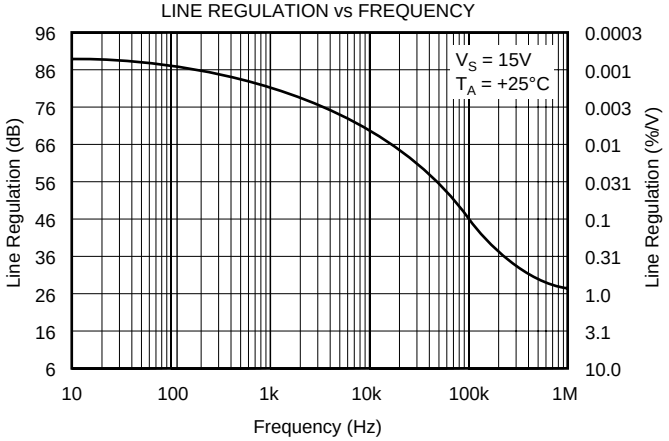
TYPICAL PERFORMANCE CURVES

AT T_A = +25°C, unless otherwise noted.

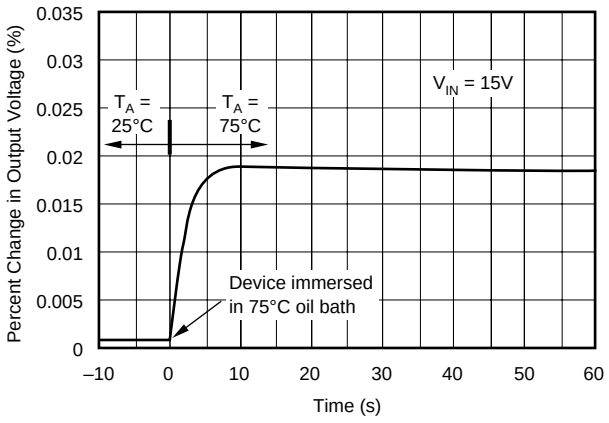
OUTPUT WIDEBAND NOISE
vs BANDWIDTH (0.1Hz to frequency indicated)



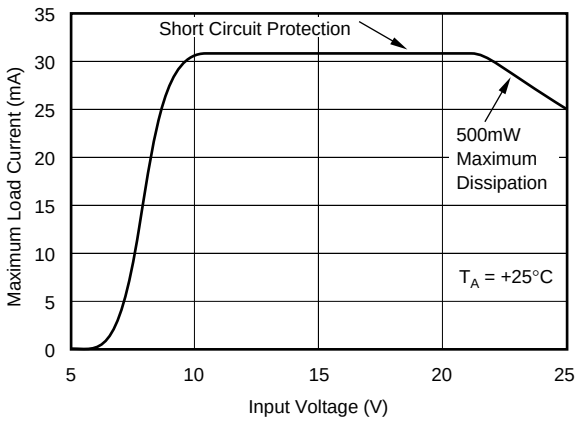
LINE REGULATION vs FREQUENCY



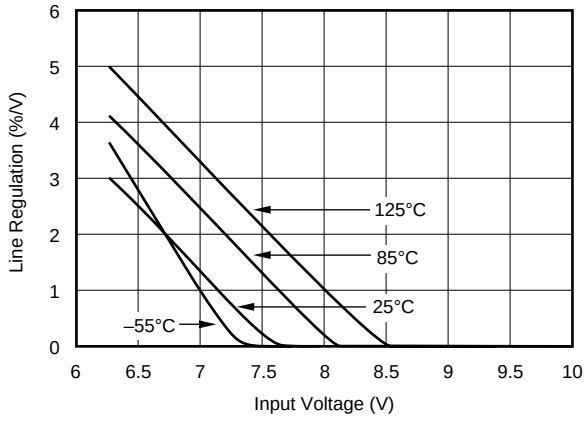
OUTPUT CHANGE DUE TO THERMAL SHOCK



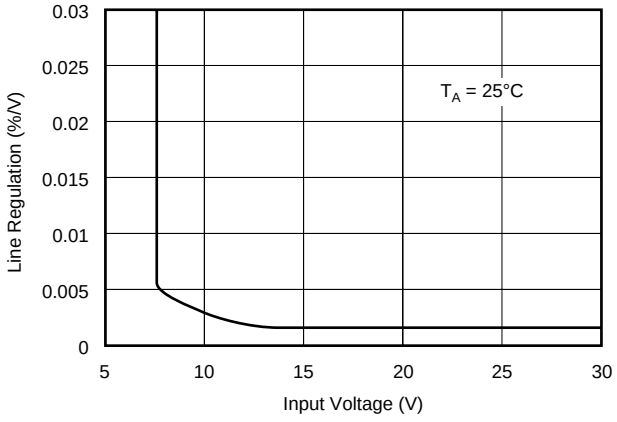
MAXIMUM LOAD CURRENT vs INPUT VOLTAGE



LINE REGULATION vs SUPPLY VOLTAGE



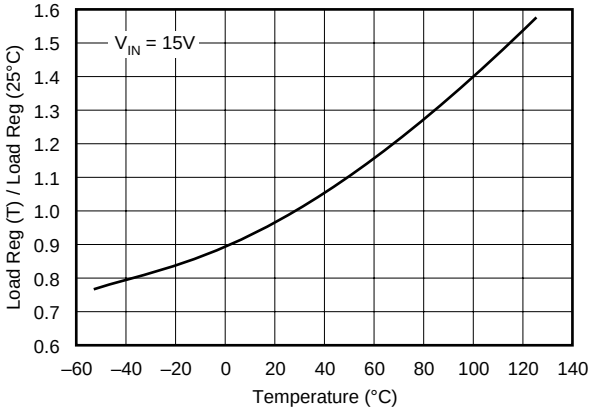
LINE REGULATION vs SUPPLY VOLTAGE



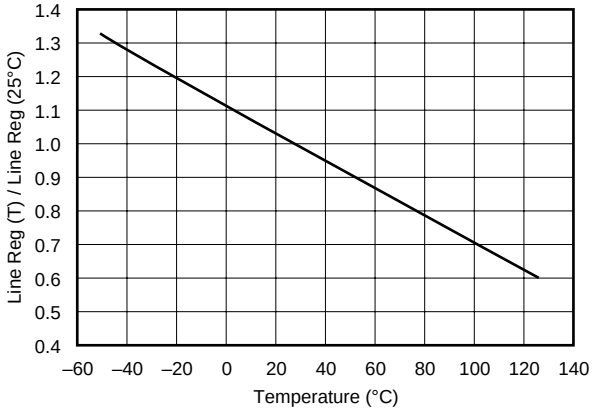
TYPICAL PERFORMANCE CURVES (Cont.)

At T_A = +25°C, unless otherwise noted.

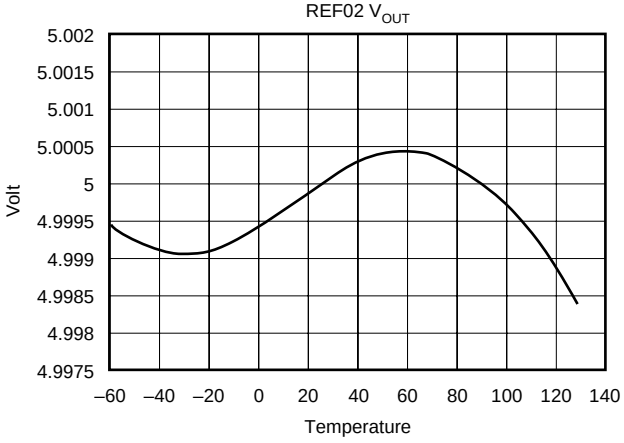
NORMALIZED LOAD REGULATION (ΔIL = 10mA) vs TEMPERATURE



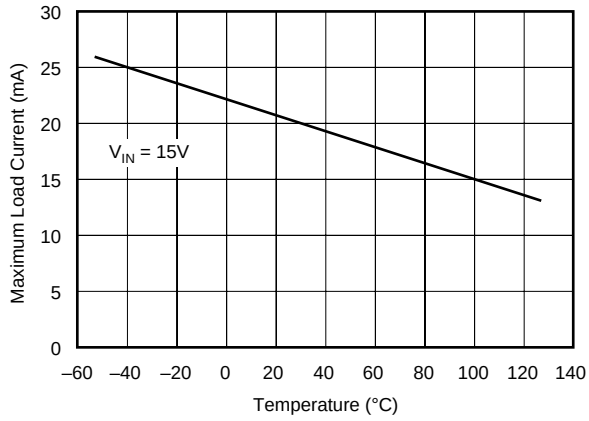
NORMALIZED LINE REGULATION vs TEMPERATURE



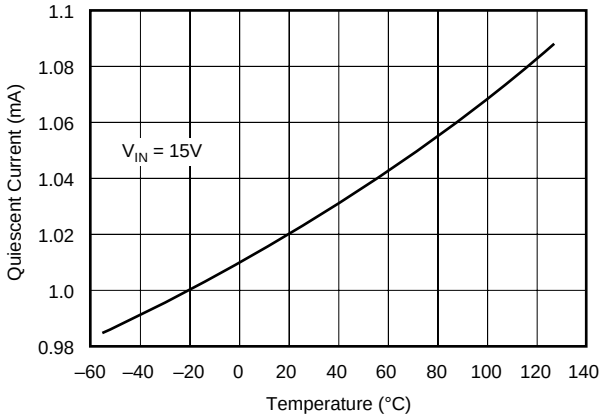
REF02 V_{OUT}



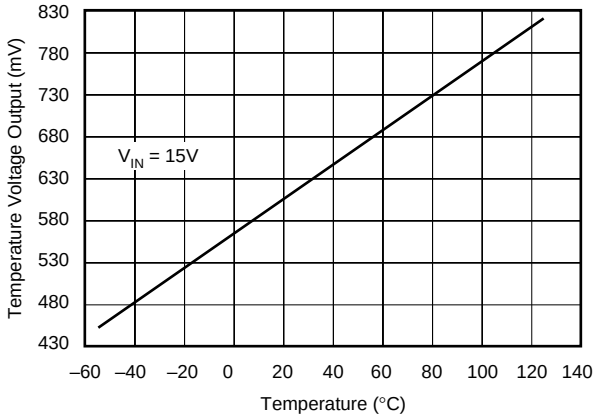
MAXIMUM LOAD CURRENT vs TEMPERATURE



QUIESCENT CURRENT vs TEMPERATURE



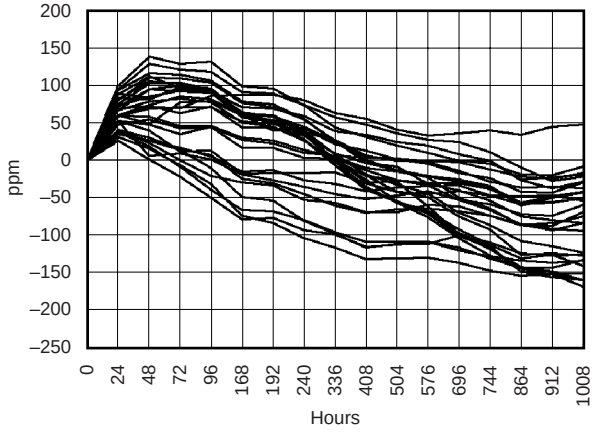
TYPICAL TEMPERATURE VOLTAGE OUTPUT vs TEMPERATURE



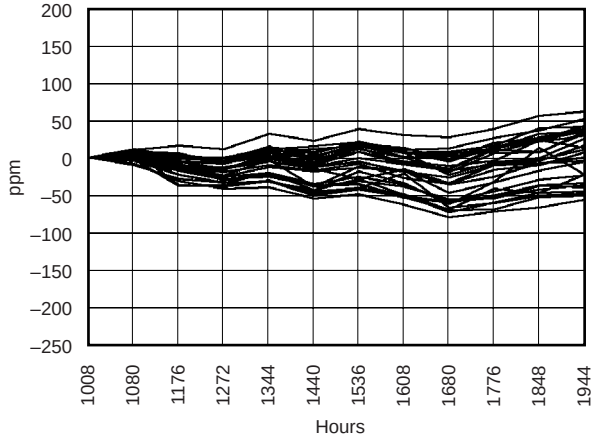
TYPICAL PERFORMANCE CURVES (Cont.)

At T_A = +25°C, unless otherwise noted.

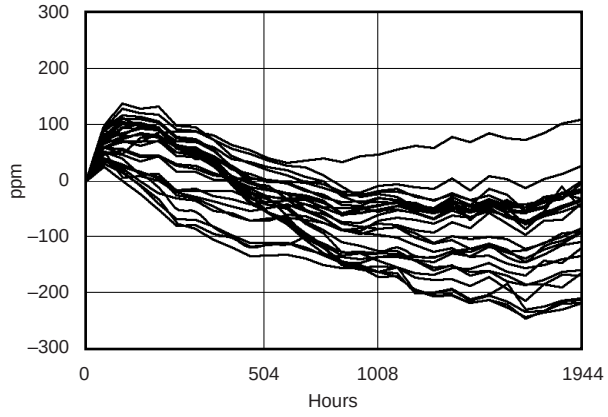
LONG-TERM STABILITY (1st 1000h)



LONG-TERM STABILITY (2nd 1000h)



LONG TERM STABILITY (2000h)



OUTPUT ADJUSTMENT

The REF02 trim terminal can be used to adjust the voltage over a 5V ±150mV range. This feature allows the system designer to trim system errors by setting the reference to a voltage other than 5V, including 5.12V(1) for binary applications (see circuit on page 1).

Adjustment of the output does not significantly affect the temperature performance of the device. The temperature coefficient change is approximately 0.7ppm/°C for 100mV of output adjustment.

NOTE: (1) 20mV LSB for 8-bit applications.

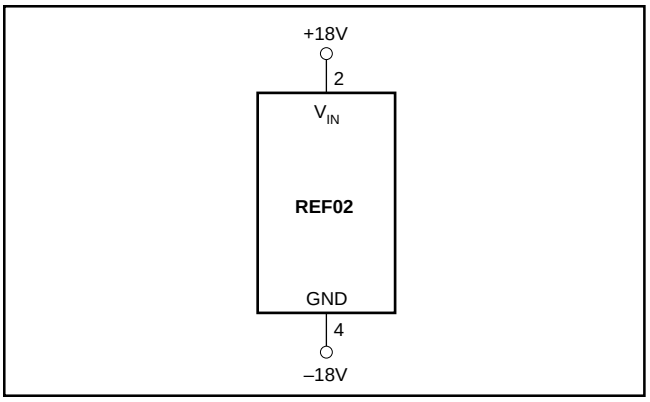


FIGURE 1. Burn-In Circuit.

REFERENCE STACKING PROVIDES OUTSTANDING LINE REGULATION

By stacking two REF01s and one REF02, a systems designer can achieve 5V, 15V, and 25V outputs. One very important advantage of this circuit is the near-perfect line regulation at 5V and 15V outputs. This circuit can accept a 27V to 55V change to the input with less than the noise voltage as a change to the output voltage. R_B, a load bypass resistor, supplies current I_{SY} for the 15V regulator.

Any number of REF01s and REF02s can be stacked in this configuration. For example, if ten devices are stacked in this configuration, ten 5V or five 10V outputs are achieved. The line voltage may range from 100V to 130V. Care should be exercised to insure that the total load currents do not exceed the maximum usable current, which is typically 21mA.

TYPICAL APPLICATIONS

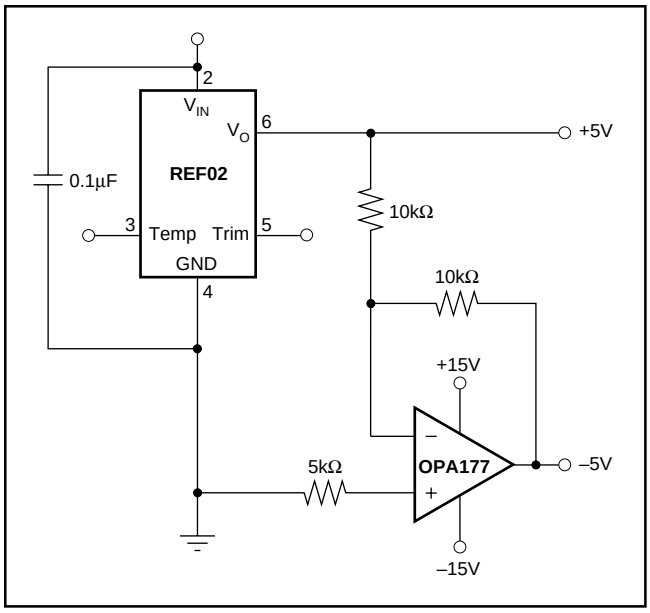
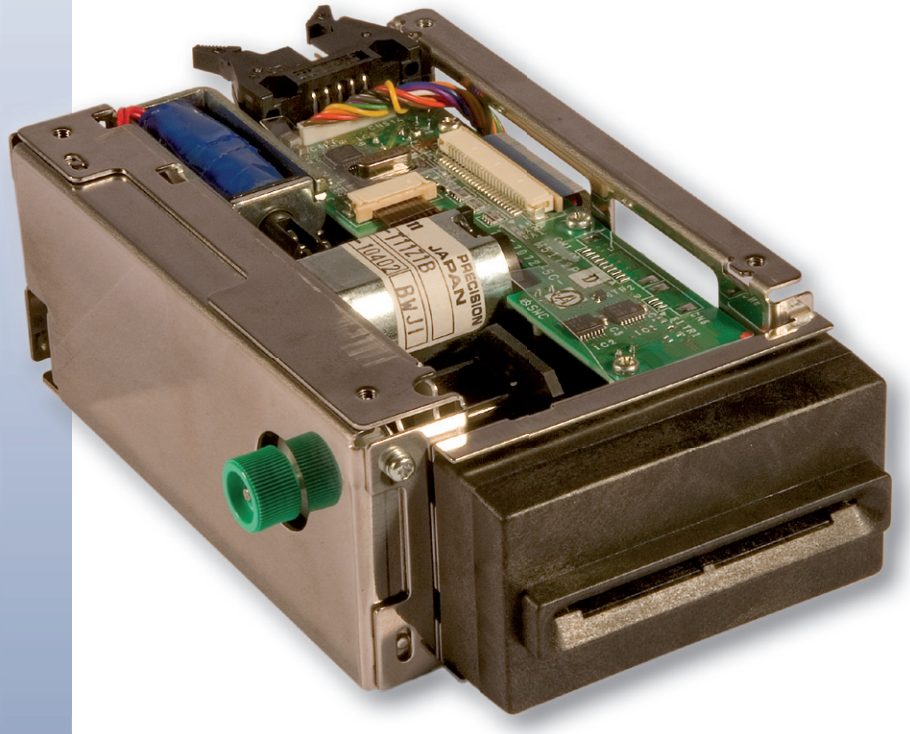


FIGURE 2. ±5V Precision Reference.

4.1. Lector de tarjetas de crédito
Hitachi-Omron V2BF

CETWIN SERVICE

V2BF Series

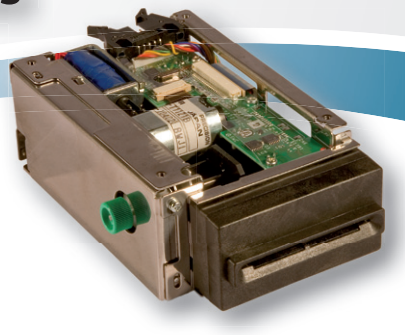


Hitachi-Omron V2BF Series

Compact hybrid reader for magnetic and chip cards

HITACHI
Inspire the Next

Hitachi-Omron V2BF Series



Features

- Highly compact motorized reader with rear ejection function and mechanical shutter
- Reads magnetic stripe, and Reads/writes both smart and memory cards.
- User friendly command protocol for easy integration
- Downloadable firmware specification updates, firmware updates, and new smart cards support without exchanging hardware
- EMV Approved

Example on applications

- Information & Payment Kiosk
- Electronic Purse
- Vending Machines
- Loyalty Card Terminal

	Model	V2BF-01JS
Magnetic Stripe	ISO 1	R
	ISO 2	R
	ISO 3	R
Chip		R/W
Memory Card		
Shutter		Mechanical
Interface		RS232
Power supply		12VDC ± 10%
Dimensions (WxDxH mm)		89x143x48
Note		

R: Read Only, R/W: Read & Write

ADDRESS Cetwin Service AB
Box 933, SE-194 29 Upplands Väsby, SWEDEN
VISITORS Kanalvägen 1A, Upplands Väsby
PHONE +46 (0)8 - 590 094 45
FAX +46 (0)8 - 444 55 00
WEB www.cetwinservice.com
E-MAIL sales@cetwinservice.com

CETWIN SERVICE

4.2. Fuente de alimentación 12 V

CP SNT 55W

CP SNT 55W 12-15V 3A

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold
Germany
Fon: +49 5231 14-0
Fax: +49 5231 14-292083
www.weidmueller.com

One-phase switched-mode power unit in a compact metal housing for rail mounting
Performance classes 55 W, 160 W, 300 W. These power supplies can be universally deployed because of their wide input range
from 85 V AC to 265 V AC. They are available with output voltages of 5 V, 12 V, 24 V and 48 V.
The 300 W ConnectPower power pack includes active PFC control and comprehensive monitoring functions.
To increase the power output, up to five power units can be connected in parallel without decoupling on the output side.

General ordering data

Type	CP SNT 55W 12-15V 3A
Order No.	9927480012
Version	Power supply, switch-mode power supply unit
GTIN (EAN)	4032248217588
Qty.	1 pc(s).

CP SNT 55W 12-15V 3A

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold
Germany
Fon: +49 5231 14-0
Fax: +49 5231 14-292083
www.weidmueller.com

Technical data

Dimensions and weights

Width	57 mm	Height	98 mm
Depth	131 mm	Weight	478 g
Net weight	633 g		

Temperatures

Humidity at operating temperature	20 to 85% RH without condensation	Humidity at storage temperature	20 to 90% RH
Operating temperature	-20 °C...40.000000 °C	Storage temperature	-40 °C...85.000000 °C

Input

Connection range	AWG 26-12 / 0.13 to 4.0 mm²	Input current	1.1 A @ 115 V AC; 0.55 A @ 230 V AC
Input current at 115 Vac	1.10 A RMS ± 20%	Input current at 125 Vdc	590 mA ± 20%
Input current at 230 Vac	0,55 A RMS ± 20%	Input current at 250 Vdc	315 mA ± 20%
Input frequency	50/ 60 Hz	Input fuse	2 A time-lag fuse (internal)
Input voltage (voltage mode input)	85...265 V AC, 120...300 V DC	Surge protection	Varistor
Turn-on current limit	Thermistor	Wire connection method	Screw connection

output

Connection range	AWG 26-12 / 0.13 to 4.0 mm²	Control at 10...100% load	1%
Control at input voltage	0.80%	Mains failure bridge-over time	30 ms @ 115 V AC / 180 ms @ 230 V AC
Max. capacitance at output	10000 µF	Max. residual ripple	< 50 mV_{eff}
Output current	3 A	Output power	36 W
Output voltage	12...15 V	Output voltage type	DC
Overload protection	Surge current / thermal cut-out	Parallel connection option	No
Surge protection	Varistor	Wire connection method	Screw connection

General data

Building Width	57 mm	Building height	98 mm
Degree of efficiency at max. load	78%	Depth	131 mm
EMC standards	IEC 61000-6 /-2, -3	Low Voltage Directive	73/ 23/ EWG
Mounting position, installation notice	horizontally, on terminal rail TS 35	Operating temperature	-20 °C...40.000000 °C
Power factor correction	No	Standards	DIN EN 50178, DIN EN 60950, IEC950
Status indication	Green LED	Switching frequency	100 kHz
Weight	478 g		

Insulation coordination

Humidity at operating temperature	20 to 85% RH without condensation	Humidity at storage temperature	20 to 90% RH
electrical isolation, I/O rail	3 kV	electrical isolation, input-earth	1.5 kV
electrical isolation, input-output	3 kV	electrical isolation, output-earth	0.5 kV

Signalling

Status indication	Green LED

Creation date June 17, 2014 5:49:59 PM CEST

CP SNT 55W 12-15V 3A

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold
Germany
Fon: +49 5231 14-0
Fax: +49 5231 14-292083
www.weidmueller.com

Technical data

Approvals

Institute (CSA)	
Certificate No. (CSA)	200039-1753630CB
Institute (cULus)	
Certificate no. (cULus)	E196651

Classifications

ETIM 3.0	EC001039	UNSPSC	30-21-18-01
eClass 5.1	27-04-90-02	eClass 6.2	27-04-90-04
eClass 7.1	27-04-90-04		

Product information

Descriptive text technical data	Derating loss: 10% @ 60°CThe internal varistor found in a switch-mode power supply does not replace the need for surge protection within a system.
Descriptive text accessories	Bracket for wall mounting: 7920560000

Approvals

Approvals	
ROHS	Conform

Downloads

Declaration of Conformity	ECC2748_02_09.pdf

CP SNT 55W 12-15V 3A

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D-32758 Detmold
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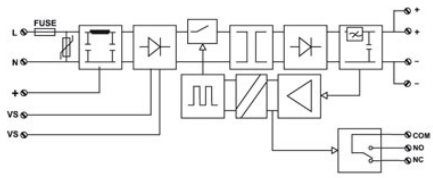
www.weidmueller.com

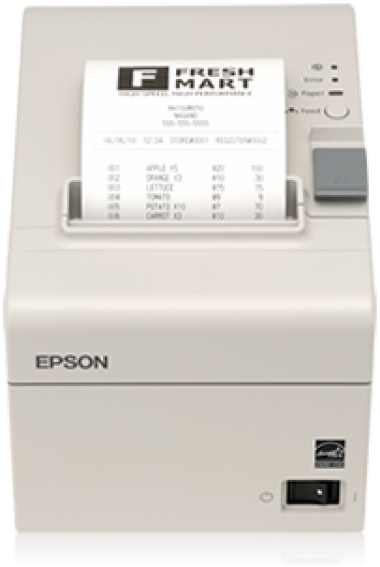
Drawings

Electric symbol



4.3. Impresora de tickets térmica *Epson TM-T20*

Epson **TM-T20**



FICHA TÉCNICA

Con esta impresora térmica de recibos, económica y sencilla de usar podrás realizar la instalación sin problemas, ya que la caja incluye todo lo necesario. Su certificación Energy Star implica una reducción de la huella de Co2, por lo que es una opción más ecológica.

CARACTERÍSTICAS PRINCIPALES

Fácil de configurar y mantener, la asequible TM-T20 es compatible con todos los sistemas operativos actuales. Con el adaptador integrado de CA, el cable de CA, el cable de interfaz y el soporte para montaje en pared, es una solución para puntos de venta completa y lista para usar.

Es una perfecta combinación de alta calidad y fiabilidad a un precio asequible y se ajustará perfectamente a cualquier punto de venta.

Este fiable dispositivo imprime a una velocidad de 150 mm por segundo, lo que indica que podrás imprimir con rapidez y sin problemas ni retrasos.

Este producto cumple las estrictas directrices ENERGY STAR® y se alinea con el compromiso de Epson con la protección del medio ambiente para las generaciones venideras. Esto se consigue reduciendo significativamente el consumo eléctrico, lo que protege el medio ambiente y permite ahorrar energía y dinero sin que la calidad se vea afectada.

EPSON®
EXCEED YOUR VISION

ESPECIFICACIONES DEL PRODUCTO

INTERFACES	
Interfaces	RS-232, Apertura de cajón
ENCENDIDO	
Fuente de alimentación	Alimentación interna
Tensión de servicio	24 V
GENERAL	
Dimensiones del producto	140 x 199 x 146 mm (ancho x profundidad x altura)
Peso	1,7 kg
Color	Epson Dark Gray / Epson Cool White
Nivel de ruido	Operación: 55 dB (A)
Instalación	Horizontal, Vertical, Soporte para pared
Conectores interfaz	D.K.D. function (2 drivers)
Humedad del aire	Operación 10% - 90%, almacenamiento 10% - 90%
Temperatura	Operación 5°C - 45°C, almacenamiento -10°C - 50°C
FUENTES Y ESTILOS	
Velocidad de impresión	150 mm/s
Tamaño de letra	0,88 mm (ancho) x 2,13 mm (alto) / 1,25 mm (ancho) x 3 mm (alto)
Registro de caracteres	95 alfanumérico, 18 internacional, 128 × 43 gráfico
Caracteres por pulgada	22,6 cpp / 16,9 cpp
Densidad de puntos	203 ppp x 203 ppp
OTROS	
Garantía	24 meses Reparación en taller

INFORMACIÓN LOGÍSTICA

Dimensiones embalaje individual	193 x 242 x 236 mm
Peso de la caja	2,3 kg
Cantidad para pedidos múltiples	4 Unidades

Epson **TM-T20**

INCLUYE

- Equipo
- Instrucciones de instalación
- Manual de usuario (CD)
- Controladores y utilidades (CD)
- Cable de alimentación
- Rollo de papel térmico
- Tapa del botón de conexión
- Soporte para montaje en pared
- Pies de goma
- Papel de 58 mm de ancho, placa guía

ACCESORIOS OPCIONALES

- Epson OT-BZ20-634: ZUMBADOR EXTERNO OPCIONAL para T88 y T20
  C32C890634

Epson Ibérica, S.A.U.
Tel.: 93 582 15 00
Tel.: 902 49 59 69 (Preventa)
Fax: 93 582 15 55

Central: Cerdanyola
Avda. Roma, 18-26
08290 Cerdanyola del Vallès (Barcelona)

www.epson.es

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4.4. Pantalla Táctil *MaxPos DTK-1598*

Pantalla TFT táctil MaxPos DTK-1598

Descripción rápida

Monitor táctil MaxPos TFT/ LCD Color, táctil resistiva de 5 hilos. Pantalla de 15" con gran ángulo de visión. Con peana/soporte de metal

Detalles

- Panel:15" 4:3 TFT-LCD
- Peana: Metal
- Resolución: (Color) 1024*768
- Contraste: 500:1
- Brillo: 250cd/m2
- Ángulo de visión: H:150°V:130°
- Señal de entrada: USB
- Panel táctil resistivo 5 hilos
- Medidas: 389*376*59mm
- Condiciones ambientales de entorno de trabajo: De 0ºC a 45ºC
- Color: 16.7M

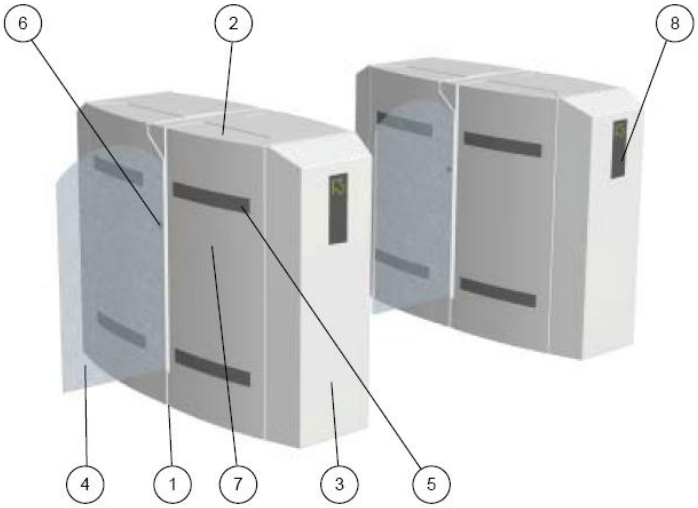
Información adicional

Dimensiones	368*293*53MM
Fabricante	MaxPos
Tamaño	15 pulgadas
Puertos / Interface	USB
Procesador	
Tipo pantalla	Resistivo
Opciones	No
Resolución	1024x768
Modelo	DTK-1598
color	Negro
Garantía	1 año

4.5. Puertas automáticas

PNG 390 y PNG 390 Twin

PNG390



La puerta automática PNG 390 proporciona un control de paso disuasorio de entrada y salida.

La puerta PNG 390 se ha desarrollado inspirándose en la estética del modelo PNG 380, aunque con un pasillo más ancho (entre 800 y 900 mm), que permite pasar cómodamente a las personas con movilidad reducida, que se desplazan en silla de ruedas, con carros u objetos voluminosos.

Su cuidada estética garantiza una integración óptima en todo tipo de arquitecturas. Los materiales empleados en su fabricación han sido seleccionados por su resistencia, robustez y seguridad, fruto de la experiencia que Automatic Systems ha acumulado durante muchos años.

La puerta PNG 390 consta de tres elementos: un componente central que agrupa las principales funciones de control de acceso físico, y dos componentes, uno en la parte delantera y otro en la parte trasera, que incorporan un sistema de control de acceso adaptado a las necesidades del cliente (con lector de tarjetas, por ejemplo).

Precauciones de uso

- Por razones de seguridad, los niños (usuarios de altura inferior a 1 m) deben estar vigilados por un adulto alrededor de la unidad y durante el paso por el portillo.
- En caso de utilización del portillo por un niño acompañado de un adulto, el primero deberá pasar obligatoriamente por delante del adulto.
- Si se prevé la utilización regular por parte de niños, Automatic Systems recomienda el montaje de todas las opciones específicas previstas, a fin de optimizar el nivel de protección.

Descripción

1. Armazón autoportante: presenta una gran rigidez e incorpora el grupo electromecánico de arrastre de los obstáculos móviles, las células fotoeléctricas de detección de presencia de los usuarios y los dispositivos de control electrónicos.
2. Puertas de acero pintado (color de serie disponible: RAL5018, azul turquesa. Otros colores RAL como opción).
   Montadas sobre bisagras, estas puertas se abren hasta 90° y permiten acceder fácilmente al grupo electromecánico y a los dispositivos de control electrónicos. Las puertas se bloquean mediante cerraduras de seguridad.
3. Componentes de la parte delantera y trasera: fabricados en chapa de acero inoxidable AISI 304L con acabado cepillado. Estos elementos incorporan el sistema de control de los usuarios (lector de tarjetas, o equivalente) para uno o ambos sentidos de paso.
4. Obstáculos de seguridad de vidrio templado de color claro: 12 mm de espesor, se retraen hacia el interior de la carrocería con cada movimiento de apertura. Altura de serie desde el suelo: 1000 mm (hasta 1900 mm, como opción).
5. Células fotoeléctricas de detección: controlan la progresión de los usuarios por el pasillo.
6. Célula fotoeléctrica de protección: garantiza la seguridad de los usuarios al pasar por delante del obstáculo.
7. Lógica y motorización: la lógica de control programable, que garantiza la gestión de la PNG, incluye:
   - Terminales generales de conexión
   - Una alimentación de 24 V CC
   - Un autómata programable,
   - Un variador de frecuencia

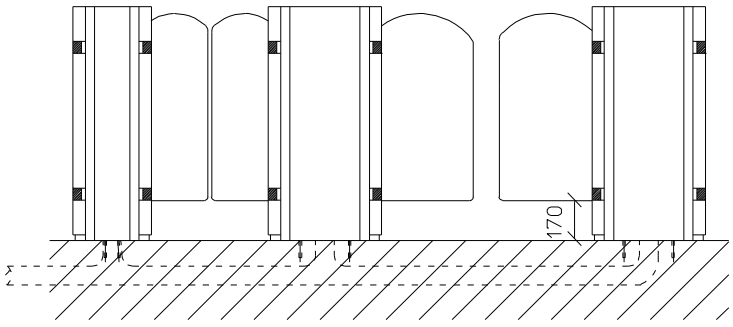
   El equipo dispone de un motor asíncrono gestionado por un variador de frecuencia, que permite realizar maniobras rápidas con una aceleración y ralentización progresivas en fin de carrera. Un dispositivo de biela/manivela transmite los movimientos a los obstáculos.
   El sistema está equipado con un limitador de par que reduce la fuerza de choque en caso de que los obstáculos tropiecen con un objeto o un usuario (sistema de protección). La motorización incluye un sistema de apertura automática de los obstáculos en caso de corte de la corriente (sistema antipánico).
8. Pictograma de orientación en los dos sentidos de paso.

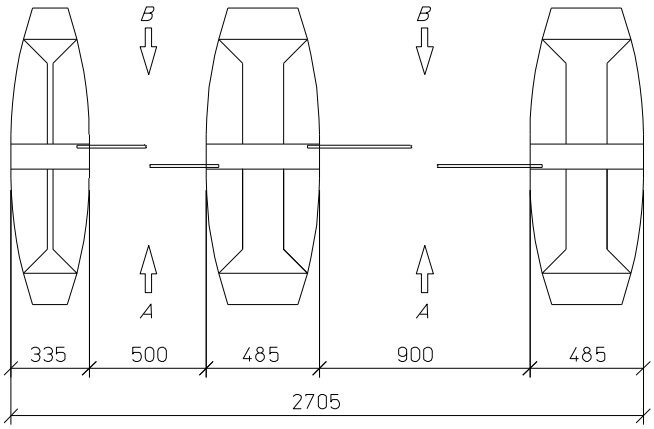
También se encuentra disponible un equipo similar con la homologación "UL".

Especificaciones técnicas estándar

- Suministro eléctrico: 230 V monofásico, 50/60 Hz. (no conecte a una red flotante o en una red de distribución industrial conectada a tierra a través de alta impedancia)
- Motorreductor: 0,12 kW.
- Limitador de par: electrónico.
- Reductor de velocidad: reversible, con engrasado permanente.
- Ajuste de velocidad: mediante un variador de frecuencia.
- Consumo nominal: 250 W/pasillo.
- T° ambiente de funcionamiento: 0 a + 50 °C.
- Peso neto: comp. lateral (I o D): 220 kg
  comp.intermedio: 280 kg.
- Tiempo apertura/cierre: 0,7 s (+tiempo accionamiento del lector/monedero).
- Tiempo de cierre: 0,8 s (+tiempo accionamiento del lector/monedero).
- Se trata de un equipo IP40.
- MCBF (promedio de ciclos entre averías), respetando las recomendaciones de mantenimiento: 2.500.000 ciclos.
- Cumple con las normas CE.

Dimensiones estándar (mm)





Tratamiento anticorrosión

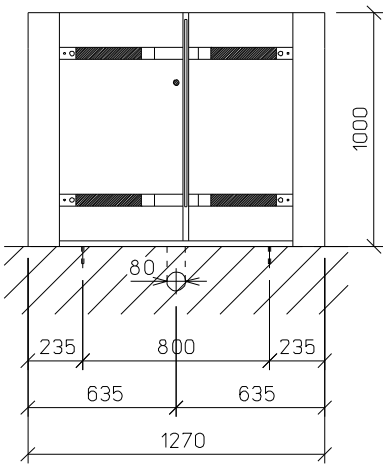
Todas las piezas mecánicas han recibido un tratamiento contra la corrosión mediante electrocincado.

Opciones

- Versión 120 V - 60 Hz - monofásica.
- Pictograma de funcionamiento.
- Banda de seguridad de silicona en el borde de los obstáculos móviles.
- Obstáculo móvil de 1.200, 1.700 ó 1.900 mm de altura y obstáculo fijo con una altura equivalente.
- Varias posibilidades para incorporar un sistema de control de acceso.
- Puertas en colores RAL distintos al de serie (indicar color en el pedido).
- Puertas de acero inoxidable.
- Sistema de calentamiento para funcionamiento hasta -20°C.
- Grabado de logotipo en los cristales móviles y/o fijos.
- Logotipo adhesivo.
- Células fotoeléctricas de protección en los obstáculos fijos.
- Células de protección reforzada.
- Células de protección de carros ("trolley").

Elementos que debe prever el cliente

- Alimentación eléctrica.
- Cableado eléctrico de alimentación y conexión con los dispositivos de control.
- Posibles incidencias de los trabajos de albañilería.

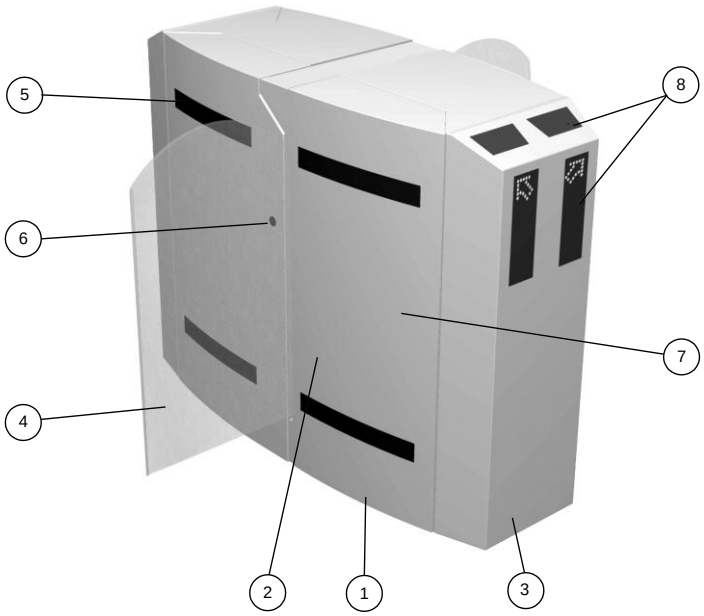


Principio de aplicación

Un pasillo de acceso consta de un componente izquierdo y otro derecho, y cada uno de ellos cuenta con un obstáculo que funciona simultáneamente. Para conformar una instalación con varios pasillos en batería, basta con situar entre estos uno o varios equipos intermedios, cada uno de ellos con dos obstáculos que funcionen de forma síncrona con respecto al pasillo que vayan a controlar. (véase más adelante).

Automatic Systems se reserva el derecho a actualizar esta ficha en cualquier momento así como a modificar la información contenida en ella sin previo aviso

PNG390 Twin



El pasillo de seguridad PNG 390 TWIN proporciona un control de paso disuasorio, tanto de entrada como de salida.

La puerta PNG 390 TWIN ha sido creada a partir de la PNG 390 (componente intermedio) y permite controlar el paso en dos pasillos (de entre 450 y 500 mm cada uno).

Su cuidada estética garantiza una integración óptima en todo tipo de arquitecturas. Los materiales empleados en su fabricación han sido seleccionados por su resistencia, robustez y seguridad, fruto de la experiencia que Automatic Systems ha acumulado durante muchos años.

Precauciones de uso

- Por razones de seguridad, los niños (usuarios de altura inferior a 1 m) deben estar vigilados por un adulto alrededor de la unidad y durante el paso por el portillo.
- En caso de utilización del portillo por un niño acompañado de un adulto, el primero deberá pasar obligatoriamente por delante del adulto.
- Si se prevé la utilización regular por parte de niños, Automatic Systems recomienda el montaje de todas las opciones específicas previstas, a fin de optimizar el nivel de protección.

Descripción

1. Armazón autoportante: presenta una gran rigidez e incorpora el grupo electromecánico de arrastre de los obstáculos móviles, las células fotoeléctricas de detección de presencia de los usuarios y los dispositivos de control electrónicos.
2. Puertas: de acero pintado (color de serie disponible: RAL5018, azul turquesa. Otros colores RAL como opción). Montadas sobre bisagras, estas puertas se abren hasta 90° y permiten acceder fácilmente al grupo electromecánico y a los dispositivos de control electrónicos. Las puertas se bloquean mediante cerraduras de seguridad.
3. Componentes de la parte delantera y trasera: fabricados en chapa de acero inoxidable AISI 304L con acabado cepillado. Estos elementos incorporan el sistema de control de los usuarios (lector de tarjetas, o equivalente) para uno o ambos sentidos de paso.
4. Obstáculos de seguridad de vidrio templado de color claro: 12 mm de espesor, se retraen hacia el interior de la carrocería con cada movimiento de apertura. Altura de serie desde el suelo: 1000 mm (hasta 1900 mm, como opción).
5. Células fotoeléctricas de detección: controlan el avance de los usuarios por el pasillo.
6. Células fotoeléctricas de protección: garantizan la seguridad de los usuarios al pasar por delante del obstáculo.
7. Lógica y motorización: lógica de control programable que gestiona la PNG. Incluye:
   - Terminales generales de conexión
   - Una alimentación de 24 VCC
   - Un autómata programable
   - Un variador de frecuencia

   El sistema cuenta con un motor asíncrono gestionado por un variador de frecuencia que permite realizar maniobras rápidas con una aceleración y deceleración progresivas al final de la carrera. Un dispositivo de biela/manivela transmite los movimientos a los obstáculos.
   El sistema está equipado con un limitador de par que reduce la fuerza de choque en caso de que los obstáculos tropiecen con un objeto o un usuario (sistema de protección). La motorización incluye un sistema de apertura automática de los obstáculos en caso de corte de la corriente (sistema antipánico).
8. Pictogramas de orientación y de función: en ambos sentidos de paso.

Tratamiento anticorrosión

Todas las piezas mecánicas han recibido un tratamiento contra la corrosión mediante electrocincado.

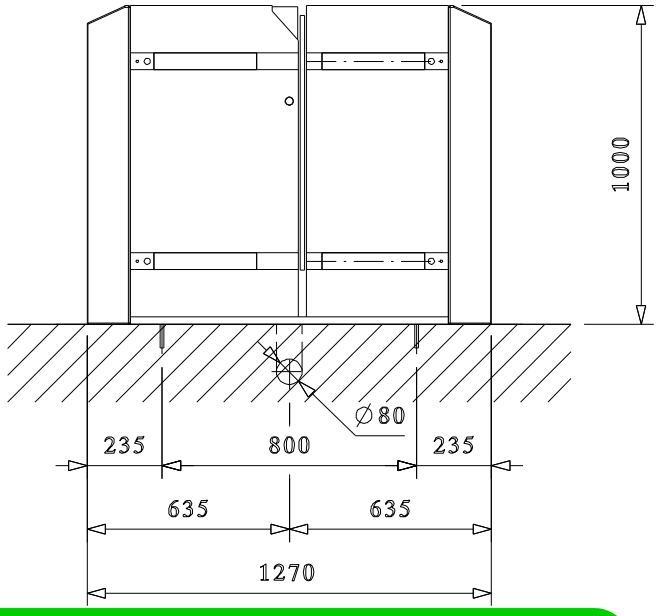
Especificaciones técnicas de serie

- Suministro eléctrico: 230 V monofásico, 50/60 Hz.
  (no conecte a una red flotante o en una red de distribución industrial conectada a tierra a través de alta impedancia)
- Motorreductor: 0,12 kW.
- Limitador de par: electrónico.
- Reductor de velocidad: reversible, con engrasado permanente.
- Ajuste de velocidad: mediante un variador de frecuencia.
- Consumo nominal: 700 W.
- T. ambiente de funcionamiento: 0° a + 50 °C.
- Peso neto: 280 kg.
- Tiempo de apertura: 0,7 s (al margen del tiempo de accionamiento del lector/monedero).
- Tiempo de cierre: 0,8 s (al margen del tiempo de accionamiento del lector/monedero).
- Se trata de un equipo IP40.
- MCBF (n.º medio de ciclos entre averías), respetando las recomendaciones de mantenimiento: 2.500.000 ciclos.
- Conformidad con la normativa CE.

Labores a cargo del cliente

- Suministro eléctrico.
- Cableado eléctrico de alimentación y conexión con los dispositivos de control.
- Posibles incidencias de los trabajos de albañilería.

Dimensiones estándar (mm)

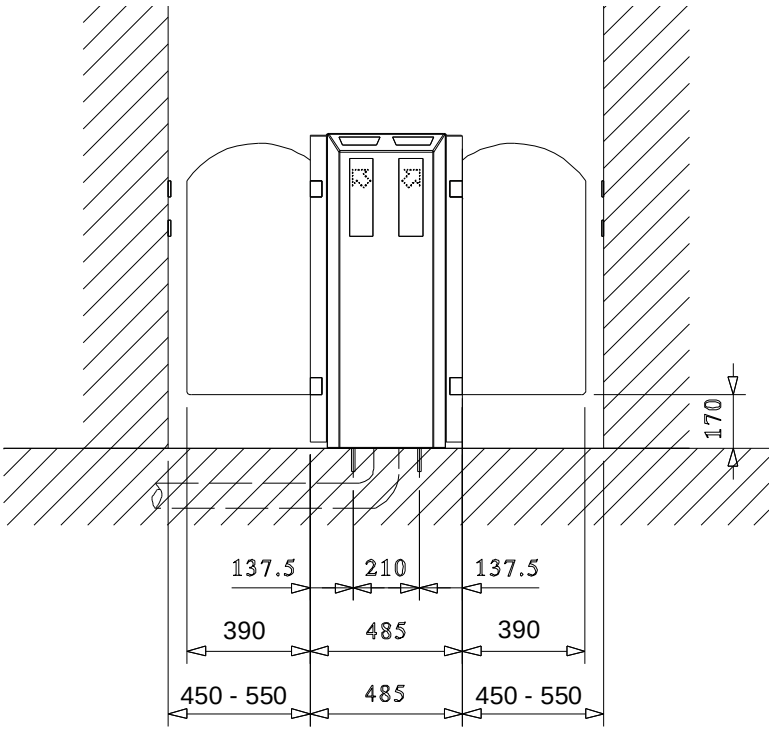


Opciones

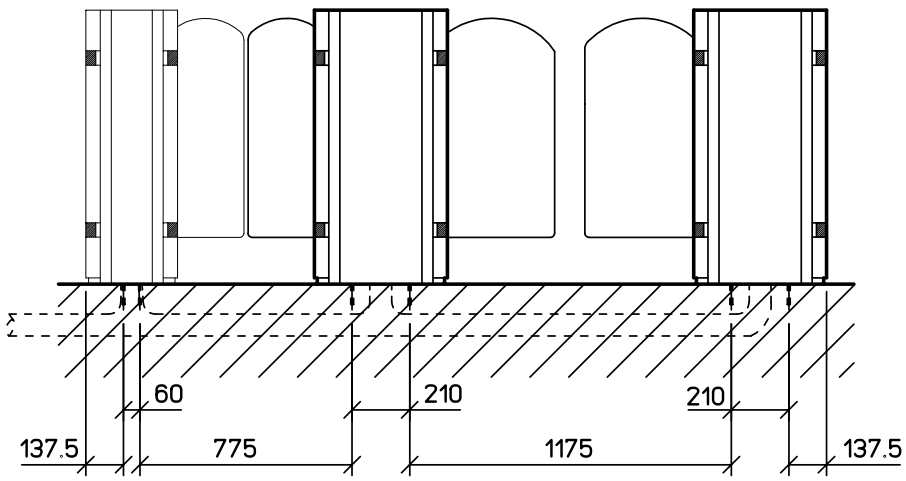
- Versión 120 V - 60 Hz - monofásica.
- Obstáculo móvil de 1.200, 1.700 ó 1.900 mm de altura y obstáculo fijo con una altura equivalente.
- Varias posibilidades para incorporar un sistema de control de acceso.
- Puertas en colores RAL distintos al de serie (indicar color en el pedido).
- Puertas de acero inoxidable.
- Adaptaciones para que el sistema funcione hasta a -20 ℃.
- Grabado de logotipo en los cristales móviles y/o fijos.
- Logotipo adhesivo.
- Placas de acero inoxidable para tapar los pictogramas no utilizados.
- Banda de seguridad de silicona en el borde de los obstáculos móviles.

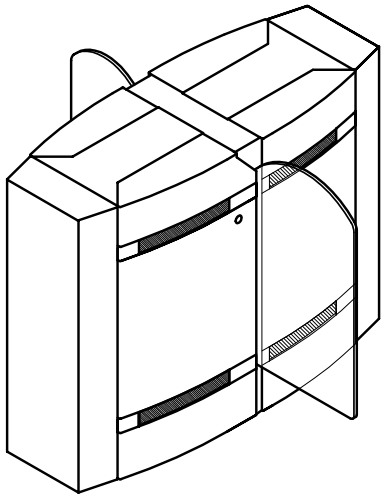
Principio de aplicación

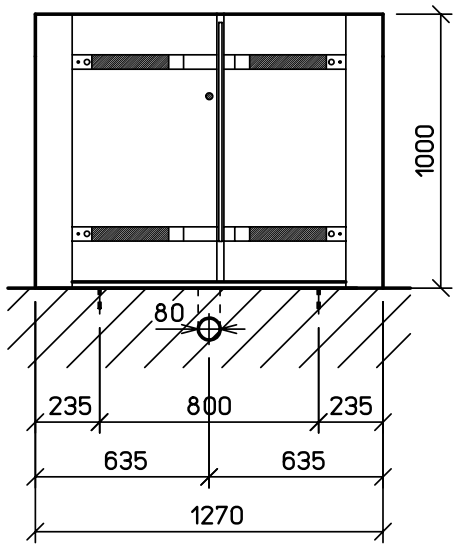
El modelo PNG 390 TWIN se instala entre dos muros, paredes o barandillas. El elemento central está provisto de dos obstáculos móviles independientes que permiten el control del paso en los dos pasillos.



Con el fin de integrar de manera constante los últimos avances tecnológicos, Automatic Systems se reserva el derecho a actualizar esta ficha en cualquier momento así como a modificar la información contenida en ella sin previo aviso



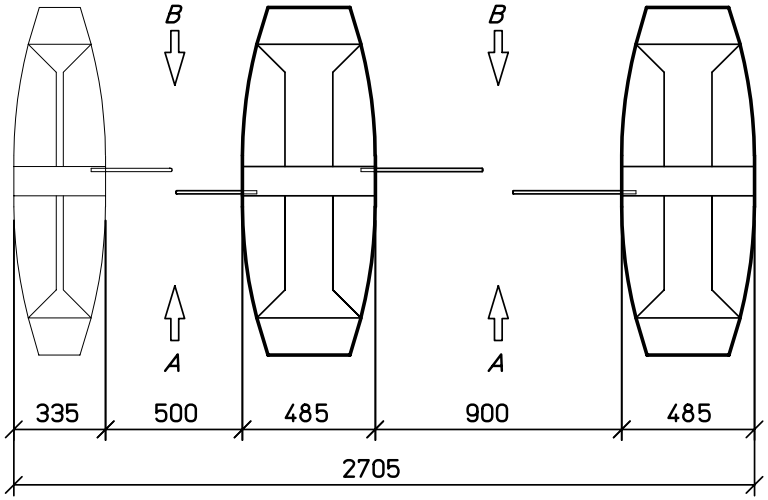




LEFT-HAND GATE
PNG 380

INTERMEDIATE GATE
PNG 390

RIGHT-HAND GATE
PNG 390



TO BE PROVIDED BY CLIENT :

- SEPARATE POWER SUPPLY FOR EACH RIGHT-HAND GATE AND INTERMEDIATE GATES IN 230V ≈ + ⏚ IN 3G2.5 ²
- CONNECTION WITH EARTH WIRE 2.5 ² FROM LEFT-HAND GATE TO INTERMEDIATE GATE
- CONNECTION BETWEEN EACH UNIT IN 12 PARS 0.6 ² TYPE TPVF
- REMOTE COMMAND BETWEEN DESK AND RIGHT-HAND GATE AND INTERMEDIATE GATE IN 12 PARS 0.6 ² TYPE TPVF

SUPPLIED BY AUTOMATIC SYSTEMS :

- LIAISON CABLE BETWEEN EACH UNIT IN 4G1.5² TYPE LIYCY (MOTOR POWER SUPPLY)

NOTE :

- IN ANY CASE 3 M TAIL CABLE END MUST BE FORESEEN

DESIGNATION : BESTEMMING :	"HIGH SECURITY" AUTOMATIC GATE TYPE PNG390	

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Dit plan blijft onze eigendom en mag niet voorgelegd aan derden noch worden gekopieerd zonder schriftelijke toelating van Automatic Systems

automatic systems
Avenue Mercator, 5 - B-1300 Wavre
www.automaticsystems-group.com

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